Modelling community preparation for natural hazards: Understanding hazard cognitions.

by

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Abstract

The present study adopts a mixed methods approach, integrating data from quantitative and qualitative studies, to examine the all-hazards validity of a model developed to predict adoption of hazard preparedness measures and to systematically elicit information regarding factors that influence decisions to adopt preparation activities to minimise the effects of natural hazards. The research focuses on how social and societal factors interact to influence the adoption of protective measures against the effects of natural hazards. The premise upon which the model is based argues that that it is not information per se that determines action, but how people interpret it in the context of experiences, beliefs and expectations that are developed and enacted in a social context.

The quantitative analysis involves testing the Social Predictor Model of Intentions to Prepare for Natural Hazards (Paton, 2006) to assess the underlying social influences of intentions to prepare for both earthquakes and floods. Participants for this component of the study were from locations in New Zealand (Napier) and Australia (Benalla, Launceston, Ingham and Longford) that face high risk of exposure to earthquake and flooding hazards respectively. Findings demonstrated that the individual, community and institutional components of the model interact to influence people's intentions concerning the efficacy of adopting hazard mitigation strategies. These findings also support the applicability of the model for multiple hazards and across diverse locations

The qualitative component of the study used means-end chain theory (Gutman, 1982, 1997) to elicit more detailed information from participants regarding their decision making process regarding the adoption of preparation activities to minimise

the effects of natural hazards. Interviewees were recruited from locations at risk of flooding and earthquakes in both New Zealand (Napier) and Australia (Benalla, Victoria and Launceston Tasmania). A major finding arising from the qualitative data was the distinction people made in the trust and distrust of civic emergency management authorities. These decisions were based on the relevance that people attached to information provided by these authorities. A further important finding was the motivating role of the responsibility that individuals felt towards the wellbeing of others. Individuals felt that it was an obligation on their part to render assistance to others.

Overall, the findings indicate that facilitating sustained preparedness involves understanding how people construe the relationship between themselves, the hazard and the protective measures available to them and assisting their protective decision making within this socio-ecological context. Delivering hazard mitigation strategies thus involves engaging with community members in order to understand their needs and to render meaningful assistance in their decisions. It is when people believe that information relating to hazard mitigation is meaningful that these strategies will be attended to and adopted.

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Chapter One

Natural hazard events (e.g. earthquakes, floods, bushfire etc.) can have a devastating impact on societies. In 2008 alone 358 disasters caused by natural events affected over 214 million people worldwide resulting in almost 240,000 deaths and economic costs of approximately US $181 billion (EM: Dat, 2008). Recent natural disasters such as the 2004 Boxing Day Tsunami and Hurricane Katrina have brought issues of individual and community vulnerability to natural hazards to international attention. Recognition of this fact has prompted research into the factors and processes that influence the capacity of people and communities to co-exist with natural processes (e.g. flooding, seismic, volcanic, severe weather) whose activity can occasionally constitute highly damaging and potentially life-threatening hazards (Basoglu, Kilic, Salcioglu, & Livanou, 2004; Karanci, Aksit, & Dirik, 2005; Paton, 2006). As a result, building this capacity becomes an important aspect of risk management. An important aspect of this is the extent to which household protective measures are either adopted, or not adopted. That is, the degree to which people are prepared for hazard events.

When discussing preparation it is important to situate household preparedness within the broader concept of community preparation. Natural hazards such as earthquakes, floods and bushfires can impact on large areas and many communities. Accordingly, civic emergency management agencies have become increasing aware of the importance of increasing the ability of members of at risk communities to respond effectively and in a timely manner (Buckle, Marsh, & Smale, 2000; Berkes, 2007; Maguire & Hagan, 2007; Murphy, 2007).). Preparedness, as a strategy implemented prior to hazard events occurring, falls into the realm of mitigation

strategies. Mitigation is an important component of the hazard management process. Mitigation can occur prior to hazard events (as part of a risk management program) or, primarily, in the aftermath of natural hazard events. Mitigation strategies involve more than just the physical aspects of preparing. It allows for the lessons learnt from previous hazard experiences to inform the development and implementation of policies designed to increase community preparedness (Maguire & Hagan, 2007).

Nested within mitigation is household preparation. In contrast to mitigation, household preparation encompasses the physical activities (i.e. storing of water and food, securing household items, developing and testing household emergency plans) needed to protect the individual and the household in the event of a natural hazard, and allow them to respond in ways that safeguard their well-being. In effect, hazard preparation can be seen as part of a bottom up process, with the adoption of protective measures being the foundation from which community level preparedness to natural hazards evolves. The present study will focus on household preparedness, and on the influences that lead people living in at risk locales to adopt them.

1.1 Statement of the problem

Traditionally, a prominent component in the development and delivery of programs designed to promote the use of hazard mitigation strategies has been the assumption that providing information regarding hazards and protective measures will lead to people adopting protective measures (O'Neill, 2004). In this top down approach the message recipients (i.e. members of those communities at risk of natural hazards) have been viewed as passive receivers of hazard information rather than active participants (Murphy, 2007).

Yet, studies have consistently shown that people living in communities at risk from natural hazards have demonstrated poor knowledge of risk mitigation procedures and a reticence to adopt protective measures (e.g. Brunson & Shindler, 2004; Handmer, 2000; Siegrist & Cvetkovich, 2000). While the presentation of this information may contribute to generally high levels of awareness and risk perception it does not guarantee that people will engage in hazard mitigation activities (Anderson-Berry, 2003; Davis, Ricci, & Mitchell, 2005; Lindell & Whitney, 2000; Paton, Smith, & Johnston, 2005). Recent studies (e.g. Briggs & Stern, 2007; Lion, Meertens, & Bot, 2002; Morrissey & Reser, 2003) have suggested that information programs that emphasise the probability, magnitude and salience of a natural hazard, without providing specific information regarding what to do in such a situation, are likely to result in the degrading of preparation activities. In other words, hazard mitigation information will only be attended to and adopted if people believe that the information is meaningful to them (Anderson-Berry, 2003; Betts, 2003; Handmer, 2000).

1.2 Scope and aims of the present study

The gap in the natural hazard literature is defining the processes through which people ascribe meaning to natural hazard events. This encompasses the meaning that people attach to the event itself, its consequences and the information that is provided by civic emergency management agencies. What has been lacking from the literature are the thoughts, beliefs and expectations of people living in communities at risk of natural hazards. The present study will demonstrate that engaging in a discourse with people living in at risk communities can reveal important information regarding

specific aspects of their social environment that influence hazard preparedness decisions.

Underpinning this is the fact that it is not information per se that determines action, but how people interpret it in the context of their experience, beliefs and expectations (Brunson & Shindler, 2004; Kumagai, Bliss, Daniels, & Carroll, 2004; Smith, Baugh-Littlejohns, & Thompson, 2001; Vogt, Winter, & Fried, 2005; Whitney, Lindell, & Nguyen, 2004). It is this social context within which people form and articulate their beliefs regarding natural hazards, and the measures needed to mitigation against their consequences, that provides the rationale for this thesis. What the present study will argue is that decisions to prepare for natural hazards are not made in isolation but reflect a collective process, one that encompasses the relationships that exist between individuals, communities and institutions (the social environment).

While a more detailed discussion on the relationship between individuals and the social environment will be presented in Chapter 2 it is important to acknowledge the significant role of the social environment in forming people's intentions to prepare for natural hazards. The social environment (families, civil society organisations, social networks social norms) provides one of the main mechanisms in assisting people in establishing their social identities, gather necessary resources and organise their activities (Murphy, 2007; Poortinga, 2006). People's reactions and behaviours both before and during a natural hazard event are based to a certain extent on individual perceptions of the hazard (how it will affect their own role in community responses) but also on how they perceive others will respond to a natural hazard situation (Briggs & Stern, 2007). Briggs and Stern have termed this an

ecological process. This is reflective of the interactive nature of the social relationships (both formal and informal) that exist within a community, allowing people to construct their individual and social environment.

Recent studies have confirmed the role of social relationships (i.e. neighbours, other community members) in natural hazard preparedness decisions in areas at risk of natural hazards. Paton, Smith, Daly and Johnston (2008) found that the quality of the relationships between civic emergency management agencies and communities contributed to people's perceptions of the threat posed by volcanic activity, and perceptions of the efficacy of adopting protective measures. McIvor and Paton (2007) found evidence that a social environment (e.g. family, friends, work colleagues) conducive to the adoption of protective measures was a positive influence on individual attitudes regarding the efficacy of performing hazard preparation activities.

McIvor and Paton (2007) suggested that these findings argue for formal hazard mitigation strategies to encourage more individual and community level discourse, rather than the passive presentation of information to people. Facilitating a discourse between people regarding natural hazard issues and the necessary protective measures helps to engender and/or strengthen beliefs concerning the benefits of adopting these measures. The more that people discuss these issues, and the greater the uptake of protective measures, the more salience will be attached to these issues within the community. Consequently, this contributes to the development of attitudes and norms that are favourable to the adoption of protective measures. In other words, encourage people to view hazard preparation as being part of everyday life.

While these studies were able to implicate the social environment as an influence on considering preparation activities it is not clear exactly what aspects of

the environment were providing the motivation. Paton et al. (2008) argued that current hazard risk management practices cannot facilitate individual and community level discourse regarding natural hazards. Nor are they designed to identify and make use of those pre-existing community capacities that can assist in mitigating the consequences of natural hazards. While McIvor and Paton (2007) identified the influence of significant others (family, peers) in an individual adopting protective measures it was not clear whether people differentiated between these referents in regards to the degree of influence exhibited. This also extends to community and social factors. Are any one of these referents more influential that the other? And what specific components of the community and/or society are people using as referents when making hazard preparation decisions?

Trafimow and Fishbein (1994) have categorised referents into general and specific. General referents such as parents and spouses are important irrespective of the behaviour under consideration. Other referents are only relevant in specific situations and circumstances. For example, civic emergency agencies may only be salient referents immediately preceding or following a natural hazard event. Identifying specific social referents is vital for development of hazard mitigation programs as knowledge of which social referents can influence appropriate behaviour change can assist in streamlining the process by ensuring an efficient allocation of resources. This suggests that civic emergency management agencies need to engage with at risk communities at the individual and community level to identify those community sources of hazard information that people consider salient. These issues are important to recognise as they underpin the process by which people assign meaning to natural hazard events is constructed via their interactions with others.

These findings suggest that a more stringent analysis of those specific aspects of the social environment that influences hazard preparedness decisions is called for. This makes intuitive sense, given that a natural hazard event is not classified as a disaster until it impacts on communities (Briggs & Stern, 2007; Haque & Etkin, 2007; McEntire & Fuller, 2002). This suggests that a person's reaction to a natural hazard event, while an individual experience, is nevertheless influenced by the surrounding social environment (Barnes, 2002). This is consistent with the basic tenet of the cultural theory of risk. This theory argues that perceptions of risks and hazards arises through the interaction of cultural biases, social relationships and behavioural strategies (Dake, 1992) and are thus, culturally and socially constructed.

Cultural theory proposes that an individual's adherence to a particular pattern of social relationships (e.g. hierarchical, egalitarianism, individualism and fatalism) can help to shape their worldview, or cultural bias (Dake, 1992). This extends to perceptions of the potentially negative consequences of natural hazards. While acknowledging that different types of hazards exist, adherents to particular ways of life will disagree over the importance accorded to different hazards. According to Wildavsky and Dake (1990) people who adhere to a hierarchical way find any deviation from authority a threat to their preferred pattern of social relationships. This suggests that adherents to a hierarchical way of life are more likely to attend to official pronouncements. Egalitarians are predicted to abhor inequality within society. They are more likely to be indifferent to acts that threaten a hierarchical way of life and more concerned about technological and environmental risks. Egalitarians see the benefits associated with technological advances as being small and the attendant risks

as being high. This is due to their belief that in an inequitable society both people and the environment are likely to be exploited.

Slovic (1993) drew parallels between public perceptions of the effects of radiation and the trust that people had in authorities (i.e. the perceived similarity of values between the public and authorities). Medical uses of radiation and chemicals (i.e. x-ray equipment, chemotherapy) are deemed to be acceptable as people see the benefits associated with this use. However, continues Slovic, industrial uses of radiation (i.e. nuclear power, GM food, pesticides) are perceived by the public as having little benefit and potentially great harm. Slovic argued that these differences in perception were due to the level of trust that people had in the relevant authorities.

A more in-depth analysis is also required to assess how the nature and level of trust between community members and civic emergency management agencies (i.e. local councils/government, SES, Civil Defence) influences how people interpret their circumstances and make decisions. Trust represents an important construct natural hazard research and will be discussed in more detail in Chapter 2, and in relation to the findings in Chapters 3, 4 & 5.

However, it is important to note that trust provides a means of assessing the effectiveness of the relationships that exist between community members, organisations and civic emergency agencies (Murphy, 2007). As natural hazards occur infrequently, people have little actual experience in preparing against its consequences. To address this lack of specific knowledge people became reliant on professional agencies to provide the specialised information needed to reduce the associated uncertainty and to assist in their decision making process. Trust in emergency authorities is important as it aids in reducing uncertainty and allows

individuals to make decisions in the absence of all available information (Siegrist & Cvetkovich. 2000). Thus, it becomes important to identify those facets of the social environment that contribute to facilitating trust between civic emergency managers and community members.

The present study is arguing that community and societal level contexts must be taken into account when offering possible explanations regarding the reasons for individuals deciding to either prepare, or not prepare, themselves against the consequences of natural hazards. This extends to identifying those societal processes that facilitate a relationship of trust between civic emergency management agencies and communities. The aims of the present study are as follows:

- What influences a household/individual's decision making process regarding preparing for natural hazards.
- Are households/individuals persuaded to adopt protective measures through community and societal processes?
- Are these influences and processes the same for multiple locations and multiple natural hazards.

1.3 Overview of the Study

Chapter 2 will explain the rationale behind protective measures for safeguarding households. It will also introduce social cognitive models, in particular the Social Predictor Model of Intentions to Prepare (Paton, 2006), as a framework for assessing individual and societal influences on intentions to prepare for natural hazards.

Chapter 3 details the quantitative component of the study. As identified in Chapter 2 the Social Predictor Model of Intentions to Prepare (Paton, 2006) has been tested on an area at risk of volcanic activity. The present study will extend these findings and test the efficacy of the model in predicting intentions to prepare for natural hazards in earthquake and flood affected areas. The Social Predictor Model of Intentions to Prepare (Paton, 2006) uses generic variables to tap into those general life experiences that individuals utilise as a way of coping with the uncertainty associated with natural hazard events.

Chapter 4 will expand on this by introducing a qualitative component to the study. The qualitative data will be matched to the generic variables of the Social Predictor Model of Intentions to Prepare (Paton, 2006) to provide a greater understanding of the cognitive processes that underpin people's hazard preparedness decisions. Utilising a mixed methods approach allows for a more complete picture of the reasoning processes that underpinned participant responses in the quantitative section to emerge.

Chapter 5 further extends the qualitative approach introduced in Chapter 4 to discover new cognitive relationships that could be co-opted into future social cognitive models. The qualitative interview data used in Chapter 4 was incorporated into a hierarchical model that reveals the nature of people organisation of beliefs regarding natural hazard preparation.

The major findings and implications of the study will be discussed in Chapter 6. This chapter presents the two major findings of the qualitative study; 1) that trust and distrust of civic emergency management agencies are two discrete variables. This distinction that people make between trust and distrust originates in the relevance that

people attach to hazard preparedness information; 2) a major motivating influence on people preparing for natural hazards is the responsibility they feel for the welfare of others in the community. The implication of these findings in relation to the future applications of social cognitive models in natural hazard research will also be discussed.

Chapter Two

Natural events such as earthquakes, floods, bushfires, tsunamis etc. are part of the normal life of the Earth (Gaillard, 2007). These events in and of themselves are not problematic. It is when these events impact on humans, communities and associated vulnerabilities (in a manner in which the demands posed by the event exceed the capacity of resources to respond) that they are then classed as disasters (Briggs & Stern, 2007; Haque & Etkin, 2007; McEntire & Fuller, 2002; Shaluf, 2007). While the consequences of natural hazards are experienced by the individual the interpretations and reactions of people to natural hazards are shaped by the prevailing social environment (Barnes, 2002). When referring to the social environment, or social context, it is those social relationships (i.e. families, neighbourhoods, civil society organisations, social networks) that people utilise in the course of their everyday experiences to shape their understanding of the world.

When confronted with a situation that requires the selection of a particular behaviour the choices that people make are informed by their interactions with others in the community, and with relevant institutions (Bennett & Murphy, 1997) (see Section 2.1.4 for further discussion on the relationship between individuals and the social environment). Given that natural hazard events can impact on large numbers of people reactions to these hazards is a collective one (Briggs & Stern, 2007) and any examination of people's attitudes to the threat posed by natural hazards (and preparing, responding and recovering from natural hazard events) must include the social context within which people form these attitudes. The present study will argue that decisions regarding preparing for natural hazards are not made in isolation but reflect the influences of the surrounding social environment. Before discussing the

relationship between hazard preparedness decisions and the social environment a brief summary of what preparing for natural hazards actually entails with relation to earthquake and floods will be presented. The present study will focus on these two hazards as the consequences of these events engender a wide range of variability in preparation activities.

2.1 Protective measures for natural hazards

While natural hazard events may have different outcomes for different communities (i.e. the unpredictability and magnitude of earthquakes necessitates more contingency planning than that of floods), one common factor is that preparation activities need to happen pre-event (Lindell & Prater, 2003). Given that natural hazard events can strike with little or no warning initiating preparation procedures in times of hazard quietude ensures the protection of both person and property (Lindell & Whitney, 2000). In assessing preparedness in cyclone affected areas Morrissey and Reser (2003) have argued that the pre-disaster period is the critical time for preparation (both physical and psychological).

2.1.1 Protective measures for earthquakes

Natural hazard events such as earthquakes and floods are associated with unique characteristics that can determine what type of preparation is necessary. Earthquakes can strike without warning resulting in building collapse and destruction of life and property, as well as causing landslides, avalanches and tsunamis (Shaluf, 2007). Earthquakes occur when there is a sudden rupture in the Earth's upper layers (CDEM, 2005; Shaluf, 2007). This can result in the ground shaking, the major cause

of damage both during and after an earthquake. The intensity of the shaking is dictated by the magnitude of the earthquake (the amount of energy released), the closeness of the location to the earthquake epicentre and the geology of the location.

Earthquake sites that are located on bedrock or compressed sediments typically experience less ground shaking than sites located on soft loosely packed sediment (which tends to magnify the shaking) (CDEM, 2005). The geology of a location at risk of earthquakes can also give rise to another risk factor, liquefaction. This occurs when the soil loses its consistency and in effect, acts as a liquid. Liquefaction causes the ground to collapse, resulting in shifting or damage to buildings, roads etc. situated on or near the location (CDEM, 2005).

Given the potential for damaging impact from ground shaking and liquefaction on buildings an important component of earthquake preparedness is in ensuring that households can provide protection to inhabitants and possessions. This includes the securing of dwellings to foundations to preclude the building shifting during an earthquake (Paton, 2003). Household preparation also extends to securing of household items and objects. The ground shaking caused by earthquakes can render unsecured objects into potentially lethal missiles. Hazard adjustments within a household include securing furniture to walls and floors, strapping water heaters to walls, mounting latches onto cupboards (Lindell & Whitney, 2000).

2.1.2 Protective measures for floods

Flooding involves the significant rises in water levels of rivers, lakes, streams etc. Flash flooding can be caused by excessive rainfall or cyclonic storm surge and involves the sudden and rapid flow of a large volume of water causing inundation

(Anderson-Berry, 2003; Shaluf, 2007). Major flood events can impact on individuals, agriculture communities and towns. In the short term drowning is the primary hazard of flooding. However, long term hazards are disease due to the inundation of sanitary, sewage and drinking water systems (Shaluf, 2007).

Preparing households at risk of flood events includes having an adequate supply of sandbags to block potential water entry points such as drains and sewage, doors and low level windows. To ensure the safety of the individuals within the house electrical switch boards need to be located above expected flood levels. To facilitate the return to a normal way of life important documents and possessions need to be placed in a waterproof location, either within the dwelling or another location. Household preparation also includes establishing an evacuation route to higher ground. Irrespective of the differing characteristics of natural hazard events general preparation also incorporates the ability to survive the aftermath of a natural hazard event. This necessitates having adequate supplies of bottled water and canned food in the event that assistance from emergency services is delayed. It also includes having an emergency household plan that details what actions and evacuation procedures are necessary in the event of a natural hazard event (Lindell & Whitney, 2000; Paton, 2003).

2.1.3 Psycho-social impacts of preparing for natural hazards

The adoption of protective measures assists in protecting the individual and their household against the consequences of natural hazards. Implementing protective measures not only protects against material and economic consequences of natural hazards but also the psycho-social impacts (Basoglu et al., 2004; Paton et al., 2005;

Buckle et al., 2000). The loss of both personal coping resources and external material resources due to natural hazard events has been found to result in psychological distress (i.e. anxiety, concern, feelings of helplessness) (e.g. Sumer, Karanci, Berument, & Gunes, 2005; Sattler et al., 2002). Morrissey and Reser (2003) found that residents of a cyclone affected area who participated in an intervention program designed to improve personal coping skills reported an increase in physical preparation activities. Although an in-depth examination of psychological factors such as anxiety and personality are outside the scope of this study it is important to acknowledge the impact of physical preparation on psychological well being and vice versa. People who perceive themselves to be in control of their preparation (i.e. having a problem focussed coping style) are less likely to experience the anxiety and uncertainty associated with major natural hazard events (Sumer et al., 2005).

Catastrophic natural disasters can profoundly disrupt social and physical life (Gordon, 2004; Sattler et al., 2002). The normal social framework (i.e. social interactions) that people use to negotiate day to day life is replaced by a situation that is alien to the individual (Silberbauer, 2003). This has the effect of depriving people of those familiar reference points that are needed to compare and evaluate actions and behaviours, leading to people experiencing a dislocation from the normal interactive process (Fullilove, 1996; Maguire & Hagen, 2007). As Fullilove has pointed out any severing of these social relationships (e.g. physical and emotional) can result in alienation and deterioration in mental health. The suggestion here is that the adoption of hazard mitigation strategies can assist in the restoration of a normal way of life, thus minimising the effects of psychological distress (Gordon, 2004; Sattler et al., 2002).

The changes in the social structure that a natural hazard event can precipitate, and the disorientating effect it can have on individuals, highlights the importance of the social environment in influencing peoples interpretations and actions. Natural hazard events can cause people to lose access to those systems and functions of normal social life that were previously taken for granted. This was seen in the aftermath of the 1975 Hobart Bridge Disaster. The city of Hobart (which straddles the River Derwent in Tasmania, Australia) was physically split in two, resulting in the severing of social ties (e.g. family, friends, work life) (Sullivan, 2003). This can have psychological ramifications immediately following a disaster as people are denied access to the social support networks disrupted as a result of hazard activity (Raphael, 1986).

2.1.4 The social environment in relation to preparing for natural hazards

This brief discussion introduces the need to consider the social factors that form the context within which people construct their hazard knowledge. Natural hazards occur infrequently. As such, people generally have had little experience in the effects of a major natural hazard event, or in assessing the efficacy of preparation measures (Paton et al., 2009). In this situation people will utilise referents within their environment that are reflective of their general everyday experiences. This is in line with the previously stated contention that individuals' reactions and interpretations of hazard events are the result of accessing shared community values and experiences (Briggs & Stern, 2007). What the present study is seeking to identify is the processes that people engage in when assigning meaning to natural hazards events, and in

particular how they assign meaning to those protective measures designed to safeguard themselves and their households.

People derive meaning and make sense of their experiences with reference to significant others (i.e. family, friends) and the surrounding social environment (Barnes, 2002; Gergen, 2003; Kjaernes, 2006; Miranda & Saunders, 2003). Meaning originates in the interactions and interpretations that arise between groups of people (Barnes, 2002; Betts, 2003; Gordon, 2004; Miranda & Saunders, 2003; Silberbauer, 2003). Frequent social interaction allows for people to understand how to operate in a given social environment and also to give them a sense of who they are.

The notion of groups of people is an important one. Meaning develops within the context of shared knowledge, values and beliefs (Miranda & Saunders, 2003; Silberbauer, 2003). Through continuing debate, discourse and interaction behaviours can be modified and shaped in order to conform to existing norms. It is through this dynamic process of initiating dialogue and offering responses that information attains meaning (Gergen, 2003). Accordingly, interaction and social discourse can be seen as crucial in understanding how information is exchanged and tested until a shared meaning is arrived at (Gergen, 2003; Miranda & Saunders, 2003; Smith, Baugh-Littlejohns, & Thompson, 2001).

This interpretive process is in a constant state of flux. Individuals bring their own interpretations to a discourse or debate, reflecting their own unique world view. The interpretive processes that people make use of evolves over time as people's referent groups change over the course of a life. Situations and circumstances also change, depending on the particular context. All this combines to affect the way people interpret events and thus, modifying individual behaviour (Bennett & Murphy,

1997). This process of interactions and interpretations that arises between groups allows people to adapt, as best they can, to changes in the environment. However, it is important to reiterate that these interpretations are linked to the prevailing social relationships. In other words, the social structures within which people operate can dictate what type interpretations are made and what, if any, behaviours are necessary (Barnes, 2002). This extends to the judgements that people make concerning natural hazards. The perceived beliefs that individuals hold regarding resilience and/or vulnerability to hazards (natural, biological, technological) is influenced by the everyday experiences of people within their particular social environment (Murphy, 2007).

This has implications for the development and delivery of hazard mitigation programs. In situations of uncertainty (i.e. earthquakes, floods etc.) people will use information sources that they interact with on a regular basis. These sources can be both formal (civic emergency management agencies) and informal (family members, neighbours, community members etc.). If the perception is that formal sources are not providing relevant information then people will turn to informal sources (Briggs & Stern, 2007). However, the problem with informal sources is its potential unreliability. Pfister (2002) provided evidence that people in flood affected areas were basing preparedness decisions on the long term residents' previous flood experiences (i.e. indications of previous flood levels). Anderson-Berry (2003) reported that residents of a cyclone affected area were basing non-preparedness decisions on folklore (i.e. mountains will offer protection from cyclones) and flawed information (i.e. as reefs impede normal surge activity then the same holds for cyclones).

While these sources may assist in the reduction of uncertainty, and in some cases be factual, it can also lead people to erroneously decide against preparing. For civic emergency management agencies this argues against simply providing people with information. It necessitates an understanding of how people use the dominant social structures to construct and act upon their perceptions of risk. Through detailed explanations and definitions of what the hazard threat is, and how to overcome the consequences, hazard mitigation strategies can assist people in their preparation decisions. It is when people believe that information relating to hazard mitigation is meaningful that these strategies will be attended to and adopted (Anderson-Berry, 2003; Handmer, 2000; Pearce, 2003).

2.1.5 Presentation of hazard mitigation strategies

A major component of traditional approaches to public awareness campaigns consisted of the provision of prepared hazard mitigation information. Typically this was a one way process involved the delivery of prepared material (i.e. pamphlets, information packs etc.). These programs detailed the specific tasks necessary for individuals to protect themselves and their households with success being measured by the level of public awareness of the information presented. This approach is predicated on the belief that presenting information will raise awareness and thus, lead to people to initiate preparation activities (O'Neill, 2004).

However, this approach is being challenged with recent studies showing that increasing the levels of hazard awareness and risk perceptions do not automatically lead to increased hazard mitigation activities (e.g. Anderson-Berry, 2003; Davis et al., 2005; Lindell & Whitney, 2000; Paton et al., 2005). In arguing against simply

presenting harm minimisation information Poortinga and Pidgeon (2006) have suggested that instead of attending to specific government policies people tend to base preparedness decisions on general positive or negative evaluations of the hazards. This is in keeping with the findings of other studies (e.g. Lion et al., 2002; Sjöberg, 1999) that have suggested that members of the public base risk mitigation decisions on assessment of how severe will be the consequences of a hazard rather than probability information. The public tend to consider a broader set of dimensions (i.e. local knowledge, relationships) while traditional approaches are based on a more technical/scientific framework (Earle & Cvetkovich, 1994) because this approach is appropriate for formal hazard mitigation planning.

This highlights one of the main criticisms of the traditional approach, that it treats the public as passive receivers of hazard information (Lion et al., 2002; O'Neill, 2004). Because the traditional paradigm is based on delivering technical/scientific information it assumes that the target audience is a homogenous entity with the same requirements and values (O'Neill, 2004). Prevention and recovery strategies need to consider each society's susceptibility to natural hazards.

For example, technological advances (i.e. improved infrastructures and communications, computer based technologies etc.) have rendered some communities better able to respond to, and recover from, natural disasters than other communities (Metri, 2006). Brunson and Shindler (2004) have questioned the use of a 'one-size-fits-all' approach for bushfire management by pointing out geographical and social differences between at risk communities. The fact that communities are rarely homogenous entities (i.e. differences in cultural norms, social and economic circumstances) makes it important that natural hazard preparation information is

presented in such a way that it accounts for the particular environment of the target population (Drottz-Sjöberg, 2000; Handmer, 2000).

A further explanation for the reticence in the uptake of hazard preparation is that people may not be the rational information processors assumed by civic emergency management agencies. Cognitive biases such as the unrealistic optimism bias (Weinstein, Lyon, Rothman, & Cuite, 2000; Weinstein & Lyon, 1999) and the normalisation bias (Mileti & O'Brien, 1992) can act to decrease the likelihood that people will initiate preparedness behaviours by leading people to overestimate their abilities in coping with the consequences of natural hazards. The unrealistic optimism bias argues that individuals disregard harm minimisation information in the belief that they are at less risk than others. It has been found to operate in areas at risk of tsunamis (e.g. Johnston et al., 2005), earthquakes (e.g. Lindell & Whitney, 2000) and volcanic activity (e.g. Spittal, McClure, Siegert, & Walkey, 2005).

Exposure to a series of minor natural hazard events can result in people developing a normalisation bias to natural hazard preparation (e.g. Hurnen & McClure, 1997; Johnston et al., 2005; Paton et al., 2008; Vari, 2002). Because individuals have experienced little or no loss as a consequence of these events they may perceive that they can cope with any event, without considering the magnitude of subsequent events (Mileti & O'Brien, 1992). Vari (2002) identified the lack of preparation in flood affected areas of Hungary as, in part, extending from the over reliance on previous flood experience and the unwillingness to accept that future flood events could be worse.

A reduction in natural hazard preparation can also occur through people transferring their responsibility for preparing to others. Adams (1995) has labelled

this action risk compensation. In comparing themselves to others and the surrounding environment people may believe that a perceived increase in the safety of the environment (e.g. construction of levees in flood affected areas, introduction of early warning systems etc.) can lead to individuals downplaying their personal risk, resulting in a reduction of their hazard preparation activities. Etkin (1999) has argued that the setting of thresholds can lead to the transference of risk. For example, an area may be designated at risk because of its location within a 1-in-a-100 year flood area. Within this area building restrictions and protective measures exist but outside of the area no such measures exist. This renders the unprotected area at risk in the event of an extreme flood event that exceeds the 1-in-a-100 year threshold. What is happening, according to Etkin, is that perceptions of risk are transferred from frequently occurring events to atypical future events. Up to the threshold hazard perception is reduced, over the threshold and risk perception is increased. The effect of this is that long term vulnerability to hazards is increased.

What is being argued is that the reasoning processes involved in decisions regarding the adoption of protective measures are more complex than was initially thought (Paton, 2003). The operation of cognitive biases and transference of responsibility indicates that decisions regarding preparation are more than the result of individual consideration. They are intrinsically linked to the surrounding social environment. The behavioural choices that people make are the result of the negotiations that are made with those around us (i.e. family, peer groups, social groups, institutions etc.) and the significance that is attached to these entities (Bennett & Murphy, 1997). What is being argued is that information regarding the threat of a hazard and how to mitigate the consequences is assessed with reference to those

factors that make up an individual's social context. This has been influenced by the findings of several previous studies that have identified social environmental factors as an influence on intentions to prepare (e.g. Lion et al., 2002; Pfister, 2002; Paton et al., 2005).

2.1.6 Using narratives to assess the social environment

To investigate further the role of social context it is necessary to identify those specific factors that constitute it. One method that can be used is the oral histories of the people that live in locations at risk of natural hazards. Adopting this approach helps to situate the hazard experiences of the individual within their perceived reality (Denzin & Lincoln, 2003) and reveal the relationships that exist between people and communities (Liamputtong & Ezzy, 2005). According to Rappaport (1995) the personal experiences of individuals are an indication of their cognitive processes.

Narratives can provide an indication of individual and community attitudes to particular issues. It also provides a resource for authorities when trying to assess the prevailing attitudes of the community and when initiating behaviour change programs. Reporting on the responses to hazards of UK government and non-government agencies, and community groups Briggs and Stern (2007) suggest that effective preparation strategies can in part be based on the past experiences of the relevant stakeholders. Dufty (2008) has argued that oral histories should be used in conjunction with other quantitative measures to evaluate the effectiveness of flood preparedness programs. What this indicates is that for a complete picture of the factors that influence preparing a qualitative component needs to be incorporated into a quantitative approach. This will form the basis for Chapters 4 and 5. Chapter 3 will

test the efficacy of a social cognitive model is predicting intentions to prepare. To introduce this model a discussion on social cognitive models will now be presented.

2.2 Social cognitive models

What the work detailed above exemplifies is the importance of moving the focus away from elevating peoples' perceptions of threat, the usual focus of risk communication, to one that accommodates the social cognitive reasoning processes that underpin peoples decision making about the adoption of protective measures. This renders social cognitive approaches a potentially useful avenue of research. The focus of the social cognitive approach is on the motivational factors that can influence behaviour change (i.e. outcome expectancies, social relationships) and the consequences of performing a particular behaviour (Abraham, Sheeran, & Johnston, 1998).

The usefulness of the social cognitive approach for the present study is in its ability to account for individual and external factors (i.e. significant others, social support) that underpin behavioural decisions (Norman & Connor, 1996). This is important. When faced with the uncertainty associated with natural hazards the factors that people draw on when making preparedness decisions will be based on their general experiences. An examination of these general experiences and relationships will allow the identification of those mainstream community competencies that can be co-opted into hazard mitigation strategies. This would have the advantage of making these activities part of everyday life.

2.2.1 Evidence for the utility of the social cognitive approach

Evidence for the utility of the social cognitive approach has come predominantly from research into how people make decisions regarding their health risk behaviours and the adoption of health protective behaviours. This has stemmed from the realisation that the health behaviour (i.e. how individuals deal with threats to their well being) of people is influenced by those societal relationships that form their social context (Bennett & Murphy, 1997). Social cognitive models account for the cognitive antecedence of individual motivation for adopting specific behaviours (Abraham et al., 1998). Determinants of behaviour that are specific to the individual and to the social environment are also accounted for by social cognitive models (Connor & Norman, 1996).

Models such as the Theory of Planned Behaviour (Ajzen, 1991) and the Health Action Process Approach (Schwarzer & Renner, 2000) have identified the crucial role of factors such as outcome expectancy, self-efficacy and behavioural intentions in predicting sustained adoption of protective measures (Schwarzer & Renner, 2000). The Theory of Planned Behaviour (Ajzen, 1991) argues that the formation of intentions to act is predicated on positive attitudes, subjective norms and control beliefs regarding the performance of the behaviour. The Health Action Process Approach (Schwarzer & Renner, 2000) describes motivation as being initiated by a perception of threat, or perceived risk, with action on this being influenced by outcome expectancies and self-efficacy judgements. The volitional stage is characterised by the individual adopting and maintaining health protective strategies. Both these models have been used to predict intentions to perform health behaviours such as exercise (e.g. Norman, Conner, & Bell, 2000; Scholz, Keller, &

Perren, 2009), blood donation (e.g. Giles, McClenahan, Cairns, & Mallet, 2004) and improving dietary behaviours (e.g. Schwarzer & Luszczynska, 2008).

When examining volitional actions these social cognitive models emphasise the importance of (perceived) cost-benefit analyses in people's decision making process (Abraham et al., 1998). With health behaviours the costs and benefits associated with performing these behaviours are readily discernible, with the benefits that can arise from adopting these behaviours being felt in the short term. Cost-benefit ratios for hazard preparedness, however, are generally unfavourable. The costs (e.g. having to strengthen house foundations) are immediate, but the benefits may not be realised within a person's lifetime and are difficult, given the infrequent nature of hazard events, for people to define for themselves. The complex natural hazard/hazard mitigation interaction makes a further contribution to the cost side of the equation (e.g., understanding the complex relationships between diverse hazard effects, their consequences and mitigation measures is an intellectually challenging task). Collectively these factors highlight the importance of understanding the processes that lead to preparedness.

This has implications for the use of social cognitive models in hazard research. While the health literature affords opportunities to develop hypotheses regarding the adoption of hazard preparedness, further research is required to determine the validity of these social cognitive models for hazards research. Consequently, in addition to providing insights into risk management, the present study provides a new context within which to assess the utility of social cognitive models of protective actions.

Social cognitive models applicable for natural hazard research need to account for the uncertainty inherent in these events. As will be detailed below, when faced

with uncertain situations people will seek specialised information sources (i.e. civic emergency management agencies) to assist them in making hazard preparation decisions. To accommodate these factors social cognitive models need to incorporate a measure that assesses the degree of trust between individuals, communities and civic emergency management agencies. It is for this reason that the Theory of Planned Behaviour (Ajzen, 1991) and The Health Action Process Approach (Schwarzer & Renner, 2000) could not be considered for the present study.

Initial work on applying models derived from these theories to a natural hazard context has provided evidence of their ability to predict the degree to which individuals' adopt measures to protect themselves from adverse natural hazard consequences (Paton et al., 2005). Rohrmann (2000) has applied a social cognitive approach to the delivery of natural hazard mitigation information. In this approach it is not just the information that is considered but internal characteristics and the surrounding social environment. When examining the reasoning processes of individuals living in earthquakes affected areas Paton et al. (2005) found that decisions to either 'prepare' or 'not prepare' for earthquakes indicated the outcomes of discrete reasoning processes rather than the opposite ends of a preparation continuum. This finding was replicated with regard to preparing for bushfires. Paton, Burgelt and Prior (2008) found that the social context within which people operated was a major influence on decisions to either prepare or not to prepare for bushfires. What differentiated preparedness decisions was community engagement. Those people that exhibited strong ties with the community and a willingness to be involved in community activities were more likely to initiate bushfire preparedness.

Bushfire preparedness provides a succinct example of how individual preparation activities are linked to overall community resilience. Preparing for bushfire can involve safeguarding the household against entry of sparks, having adequate access to a water source, having an evacuation plan and clearing combustible material from around the home and property (Paton et al., 2006). However, the effectiveness of any one household's preparation is to a large extent impacted by the level of preparation of the neighbours.

Community resilience in the face of bushfire risk is increased if each member of that community is committed to preparing their household. Conversely, if some community members do not prepare (i.e. remove potential ignition sources from around their property) then this can put other members of the community at risk. What this example demonstrates is that individual preparation decisions are influenced by, and impact on, the surrounding social environment. Any examinations of community resilience to natural hazard events need to begin with the assessment of individual attitudes and commitment to making the necessary hazard adjustment (Berkes, 2007).

By adopting a social cognitive approach, it becomes evident that facilitating sustained preparedness will involve more than just providing people with information. It involves understanding how people construe the relationship between themselves, the hazard and the protective measures available to them and assisting their protective decision making within this socio-ecological context (Paton, 2003). Delivering hazard mitigation strategies thus involves engaging with community members in order to understand their needs and to render meaningful assistance to their decision making processes (Cottrell, 2005; Fitzsimons & Fuller, 2002).

How effective this engagement is can be assessed by the level of trust that exists between communities and emergency management authorities. Trust represents an important construct in discussions of social influences on adoption of protective measures. As natural hazards occur infrequently, and can have potentially devastating consequences, individuals can experience a high degree of uncertainty regarding the effects of these natural hazards, and mitigation activities necessary to counteract their effects. When faced with situations that engender uncertainty people can become apprehensive, and are then motivated to reduce this uncertainty (Bandura, 1997; De Cremer & Sedikides, 2005; Lion et al., 2002). In times of uncertainty people will look to sources of information that can assist in reducing this uncertainty and inform their decisions on hazard mitigation (Siegrist & Cvetkovich, 2000). The information sources that people will turn to in times of uncertainty will those that are trusted (Kjærnes, 2006; Sjöberg, 2000).

This highlights the importance of the quality of the relationships that exist between community members and authorities. A relationship of trust is founded on shared values and norms and is constructed over a period of time (Kjaernes, 2006) through interaction and discourse between individuals, authorities and others (Dalton, Elias, & Wandersman, 2001; Kjaernes, 2006). If people perceive that authorities share the same values as themselves then a relationship of trust can exist. If there are no shared values then this can lead to uncertainty (Earle & Siegrist, 2006). Thus, trust can be seen as a vital component in the process by which people manage their uncertainty.

2.3 The Social Predictor Model of Intentions to Prepare

To further explain these relationships a social cognitive model was selected that conceptualised trust as mediating dispositional factors (individual expectations regarding the outcomes of actions), structural factors (social support factors) and behaviours (Kee & Knox, 1970; Mayer, Davis & Schoorman, 1995). Using this as a theoretical framework Paton (2006) developed a model (see figure 1.) that examined the relationships between individuals, communities and civic emergency management agencies and how these factors interact to influence intentions to prepare for natural hazards and are mediated by trust. That is, to examine how people's everyday social context influenced their preparedness actions.

The advantages of this model in examining these relationships are twofold. Firstly, it encompasses an individual's perceptions of risk. It accounts for the uncertainty that it experienced in relation to natural hazards through the assessment of beliefs regarding the outcomes of preparation activities. Secondly, it recognises the importance of the social environment in shaping peoples decisions and acceptance of hazard information by exploring how the relationships between community factors and trust helps to define this environment.

According to this model people arrive at decisions to prepare through a sequential series of behaviours. The processes by which these decisions are arrived at begin with individual factors. People initially assess the benefits and costs of preparing in relation to how it will reduce uncertainty associated with natural hazards. If people hold negative outcome expectancies then no further action is taken and no preparation is undertaken. If people hold positive outcome expectancies then progression to the next stage is initiated. In this community stage people satisfy their

need for information through interacting with the community. Through this process they are able to acquire local knowledge and begin to articulate their needs as a way of reducing uncertainty.

However, community knowledge may not be specific enough to address all needs. By incorporating institutional factors the model accounts for the relationship between communities and civic emergency authorities. If people need more expert information they consult authorities. The quality of this relationship is determined by the degree to which uncertainty is reduced. If people believe they are empowered they believe they are getting the right information and are able to perform the necessary actions. Trust is the mediating factor between community processes and authorities. As this model provides the framework for the quantitative study a more in-depth explanation of the variables will now be presented.

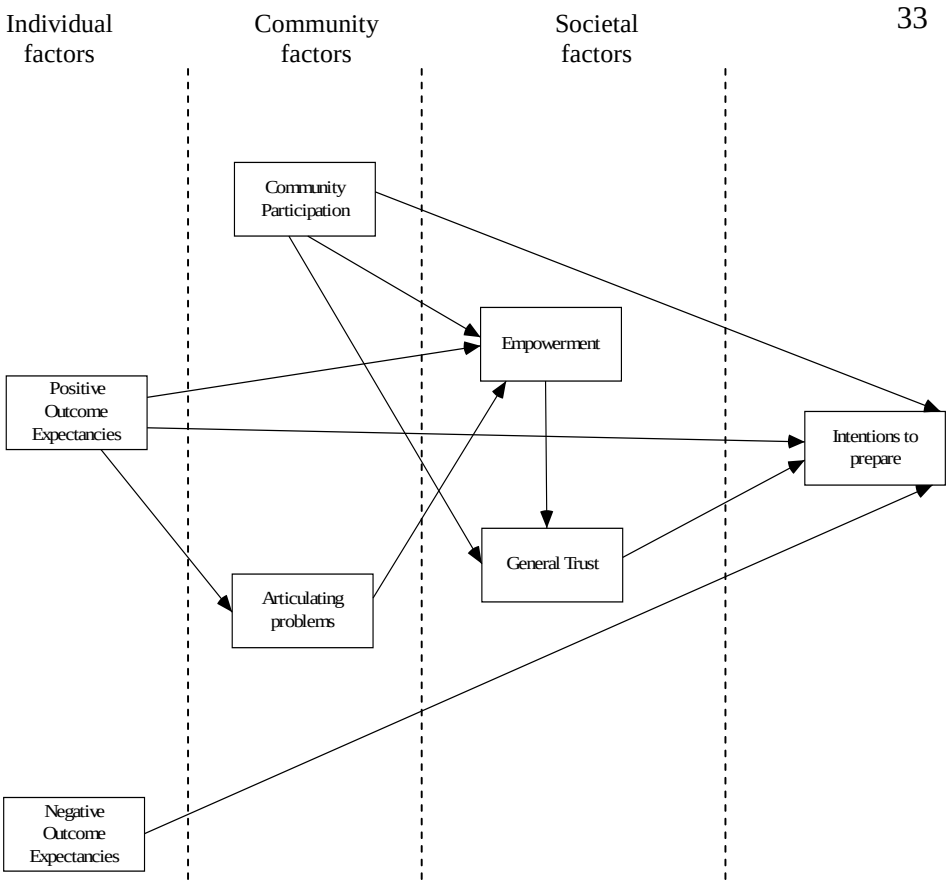

Figure 1. Social predictor model of intentions to prepare for natural hazards (Paton, 2006).

2.3.1 Individual factors

Within natural hazard research outcome expectancies represent an important variable in assessing individual perceptions of whether their actions can overcome particular problems (Bennett & Murphy, 1997; Schwarzer & Renner, 2000). One of the main factors that people consider when deciding on the associated costs and benefits of performing a particular action is the expectations that are attached to the outcomes (Bandura, 1998; Gutman, 1982; Yates & Stone, 1992). When an individual

believes that a threat is relevant they will then assess the outcome expectancies of performing that behaviour (Lion et al., 2002).

Outcome expectancies provide a way of assessing whether individuals will form intentions to prepare themselves and their households against the consequences of natural hazards (Boonzaier, McClure, & Sutton, 2005; Paton, Smith et al., 2008; Paton, Houghton et al., 2008; Vogt et al., 2005) by tapping into beliefs regarding the efficacy of personal mitigation efforts (Paton, 2008). Outcome expectancies are a useful way of assessing levels of motivation as it distinguishes between positive and negative thoughts regarding preparation (Paton, Smith et al., 2008).

Negative outcome expectancies account for beliefs that natural hazard consequences are too devastating for personal preparation activities to alleviate. In other words, the motivation to prepare is reduced if people believe that the effort to prepare is greater than the associated advantages. Positive outcome expectancies account for the beliefs that personal mitigation efforts will minimise hazard consequences and safeguard the self and others (Paton, 2008). If people believe that the advantages gained in preparing are worth the effort then the motivation to prepare is more likely.

2.3.2 Community factors

The community factors of community participation and articulating problems were included in the model to assess the social context within which hazard issues are formed and discussed. To enable people to act on these beliefs specific knowledge and skills are required. While some people may already possess the knowledge and motivation to act the irregular and complex nature of natural hazards may mean other

people do not. The uncertainty associated with natural hazards can lead to people actively seeking out the information necessary to reduce that uncertainty (Lion et al., 2002; Silberbauer, 2003). The Social Predictor Model of Intentions to Prepare (Paton, 2006) accounts for this and argues that the search for information progresses from other members of the community to civic emergency managers.

Community participation. A measure of community participation is included in the model as it is assessing the extent of people's active participation in community activities. Involving oneself in community activities can help in acquiring new skills, establishing and maintaining community bonds, contributing to the enhancement of quality of life. The measure used in the model assesses general community participation. When faced with the uncertainty that is a consequence of natural hazards people will base their preparedness decision on those community factors that represent everyday experiences. This is reflective of the proposition that people's reaction to natural hazards is based on shared community experiences, as are the choices that people make regarding managing the hazard risk (Briggs & Stern, 2007; Lion et al., 2002).

Articulating problems. The collective knowledge that community participation can provide, while helping to alleviate uncertainty, may not be enough to address specific concerns that people have. The infrequency of natural hazard events, and the associated uncertainty that is generated, means that people will require access to information that is not reflective of their general everyday experience. In this situation people will need to interact with civic emergency management authorities. To effectively engage in a dialogue with authorities people need to be able to specify their exact needs regarding preparing to reduce uncertainty. This indicates an

interactive process. People need to be able to articulate their needs, and be satisfied that the answers they receive address their concerns. This process helps to reduce uncertainty and influence perceptions of trust in authorities.

2.3.3 Societal factors

The variables that account for societal factors, empowerment and trust, were included to assess the relationship between communities and civic emergency managers. Empowerment provides a way of assessing the quality of the reciprocal interactions that exist between individuals (Dalton et al., 2001), and between individuals and societal institutions (Paton, 2006).

Empowerment. Empowerment can be thought of as a process through which individuals, communities and institutions are able to assume responsibility for their day to day activities (Rappaport, 1987). Empowerment operates at the individual, community and institutional level (Zimmerman, 1995) and is dependent on interaction and participation with the surrounding environment (Fitzsimons & Fuller, 2002; Peterson, Lowe, Aquilino, & Schneider, 2005; Smith et al., 2001).

Interaction is the key to empowerment, and is what differentiates it from community participation (Dalton et al., 2001). Involvement in community activities, while a vital part of empowerment, represents an individual trait. A person might possess the internal characteristics necessary (i.e. positive outcome expectancies, articulating problems) for empowerment but is prevented from expressing it due to the constraints of the surrounding social environment (Baillie et al., 2004; Fitzsimons & Fuller, 2002).

Empowerment strategies require that a certain amount of responsibility is devolved to community members. This includes the provision of the resources and specific information that are needed by community members to manage their preparation. For empowerment to be successful people need to believe that they are being supported by the relevant authorities in their hazard management decisions. As such, it is the quality of the relationships between individuals and authorities that defines a person's belief that they are operating within an empowering setting. It is these interrelationships between individuals and civic emergency management authorities the measure of empowerment is tapping into.

The provision of resources and information is a vital part of empowerment. Empowering individuals, while important, is not guarantee of empowerment. What needs to be considered is the environment (an empowering setting) within which people interact (Baillie et al., 2004). The variables of positive outcome expectancies and articulating problems assess individual beliefs regarding the efficacy of preparing and the ability to articulate preparation needs. However, if an empowered person is denied access to required resources (is operating within a non-empowering setting) this sense of empowerment can be eroded (Speer, 2000).

Trust. The model argues that trust is the mediating factor between individual, community and social factors and the forming of intentions to prepare for natural hazards. Trust describes the process by which people cede responsibility to others in the face of an uncertain and complex situation (Earle & Cvetkovich, 1995). This is a relevant point in relation to natural hazards. The uncertainty and complexity associated with the consequences of natural hazards can result in decisions being made with reference to the trust people have in the relevant authorities, rather than on

specific information (Poortinga & Pidgeon, 2005). In other words, decisions of trust are in effect a mental shortcut. People base their trust decisions on meanings and values that are perceived to be shared between them and those in authority (Cvetkovich, & Roth, 2000; Walls, Pidgeon, Weyman, & Horlick-Jones, 2004).

Intentions. An important aspect in facilitating the uptake of preparedness measures is to get people to actively think about their preparation. Inclusion of the variable intentions to prepare provides a means of assessing whether individuals are making conscious decisions to prepare. This is an important point as everyday activities that may be useful in the event of an emergency are not indicative of a conscious decision to prepare. For example, Anderson-Berry (2003), reporting on cyclone preparedness, found that though residents stated that they had cleared up their yards (which helps to minimise damage in the event of a cyclone) they did so in response to the local council's Christmas cleanup campaign rather than a pre-determined decisions to protect their household from the consequences of a cyclone.

The advantage of using a measure of intentions to prepare rather than a measure of actual preparedness is that it is less likely to suffer from bias from other sources. For instances, people may not adopt protective measures if they do not have the resources (e.g. monetary, specific knowledge, time) necessary to implement these measures (Paton, Bajek, Okada, & McIvor, in press). Similarly, people's beliefs regarding the timeframe of a natural hazard event renders behavioural intentions a more useful measure than actual preparedness. Paton et al. (2005) found that the likelihood of converting intentions to prepare for earthquakes into actions reduced significantly after 12 months. Given that actions linked to effective natural hazard

preparation needs to occur in periods of hazard quietude, a measure of intentions represents a relatively more stable assessment of what people are more likely to do.

Intentions are a central factor in other social cognitive models such as the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and the Theory of Planned Behavior (Ajzen, 1991). Intentions provide a measure of an individual's belief regarding the performance of a behaviour, rather than the beliefs associated with the target that the actions are directed towards. This is an important distinction to make in regards to natural hazard preparation as perceptions of the threat posed by natural hazards have been shown to be poor indicators of intentions to prepare or actual preparing (e.g. Davis et al., 2005; Lindell & Whitney, 2000).

Initial work on testing the efficacy of this model in predicting intentions to prepare for natural hazards was undertaken in a study of volcanic preparedness in Auckland, New Zealand (Paton, 2006). The findings indicated that the interaction of individual, community and societal factors predicted intentions to prepare for volcanic hazard consequences. This demonstrates that decisions regarding hazard preparation are formed with reference to the socio-environmental context within which an individual operates. Further, Paton was able to show that an important factor of the social environment was the relationship between communities and emergency management authorities and how this relationship was mediated by trust.

What this research demonstrates is that risk communication involves more than just providing information. Successful risk communication relies on shared meanings and trust (Handmer, 2000, Paton, 2008; Paton, Smith et al., 2008). Shared meanings and partnerships can only be achieved through debates, discourse and dialogue between the particular groups (Betts, 2003). A fundamental component of social

cognitive models must be its application to multiple hazards. Incorporating an all-hazards approach to the development of hazard preparation models allows for planning activities irrespective of the location, geography and demographics. The benefit of this is a more cost effective approach to the issues related to hazard preparation such as not duplicating services (Dufty, 2008). An all-hazards approach also allows for more reliable information to be presented to individuals and communities. While multiple agencies might be involved in the delivery of hazard mitigation information an all-hazards approach provides a degree of consistency to the presented information.

Using social cognitive models as a framework for communicating hazard information can only be feasible if it can be applied to multiple natural hazards. While each natural hazard has unique characteristics that cannot be incorporated into generic social cognitive models the use of these models can identify those common social variables that can be applied to multiple hazards. The all-hazards capability of the Social Predictor Model of Intentions to Prepare (Paton, 2006) forms the basis of the next chapter. The efficacy of the model will be tested through its application to both earthquake and flood affected areas. To further test the model's applicability to an all-hazards approach the locations for the study encompassed New Zealand and Australia.

Hypotheses. The model proposes that whether or not people prepare reflects the outcome of a sequence of activities (Figure 1). The process commences with peoples' outcome expectancy beliefs. An inverse relationship is hypothesised between negative outcome expectancy beliefs and intentions to prepare. If people hold positive outcome expectancy beliefs it is further hypothesised they will either proceed to

prepare, or, if lacking the information they require, proceed to work with others to articulate their needs and expectations. If these needs cannot be met within the community, it is hypothesised that whether people then prepare is a function of the degree to which community groups perceive themselves being empowered by these sources of information. This predicts levels of trust which, in turn, predicts intentions.

Chapter Three

One of the important observations of Chapter 2 was that simply providing information did not inevitably lead to natural hazard preparation. Rather, people's actions are strongly influenced by interpretive processes, with social factors being significant influences on this process. Given the heterogeneous nature of target populations (e.g. culture, language, social norms) the delivery of general hazard information may not be appropriate (Handmer, 2000). It was argued that successful delivery of hazard mitigation programs depends on the level of trust that exists between individuals and civic emergency agencies. A trusting relationship can invest hazard mitigation information received by community members with relevance. That is, it is perceived by people as addressing their specific concerns. This is important when dealing the diversity that is common to most communities.

The previous chapter argued that consideration needs to be given to the fact that people receive, interpret and act upon information regarding natural hazards in relation the surrounding social environment (e.g. family, community activities, social relationships) that is part of their general day to day experiences (Paton et al., 2009). Social cognitive models were advanced as a suitable theoretical approach from which to assess the effect of these relationships on intentions to prepare for natural hazards. The Social Predictor Model of Intentions to Prepare (Paton, 2006) presented a framework of generic factors through which hazard mitigation strategies can be communicated. Generic factors were used as they reflect common experiences that individuals encounter on a day to day basis. One of the main purposes of this model was to ascertain whether everyday experiences can be utilised in hazard mitigation programs.

The purpose of this chapter is to test the applicability of the Social Predictor Model of Intentions to Prepare (Paton, 2006) to both earthquake and flood affected locations. For this model to have practical uses in risk communication it is important that it can predict preparedness for multiple hazards in different communities (the all-hazards principle). Adopting a model of risk communication that incorporates factors applicable to predicting preparing for a range of hazards makes for a more efficient and cost effective approach to public education and risk communication. As Chapter 2 detailed (Section 2.1 Protective measures for natural hazards) earthquakes and floods have unique characteristics that can impact on the type of preparation needed. Given the degree of variability in the consequences of these hazards the present study focussed on communities at risk of earthquakes and floods to assess the all-hazards capability of model.

Geographically earthquakes and floods share similarities in that it is known that earthquakes will happen along major fault lines and floods will occur along rivers, water courses, coastal areas and floodplains (Berkes, 2007). However, it is the geographical aspects of earthquakes and floods that also highlight a major difference, the predictability of these events. Floods, with the exception of flash flooding, can to a certain extent be predicted (Shaluf, 2007). Particular areas are known to be at risk of flooding in the event of excessive rainfall or cyclonic storm surges. In contrast it is almost impossible to predict when a major fault line will rupture, causing earthquakes (CDEM, 2005).

Thus, the aims of this study are:

- to ascertain whether the Social Predictor Model of Intentions to Prepare (Paton, 2006) is applicable for flood and earthquake affected areas

- Whether the individual, community and societal variables that make up the Social Predictor Model of Intentions to Prepare have the same influence for communities in flood and earthquake affected areas.

This chapter will begin by detailing the locations that were used in the study. Napier (New Zealand) was selected for this study due to its unique geographical characteristics that renders it particularly susceptible to seismic activity. Benalla (Victoria), Invermay (Tasmania), Ingham (Queensland) and Longford (Tasmania) were selected due to their vulnerability to flooding. The data analysis will then be presented including the structural equation models and the rationale for using structural equation modelling. The chapter will conclude with a discussion of the results that demonstrate the suitability of the Social Predictor Model of Intentions to Prepare (Paton, 2006) in an all-hazards application.

3.1 Earthquake study

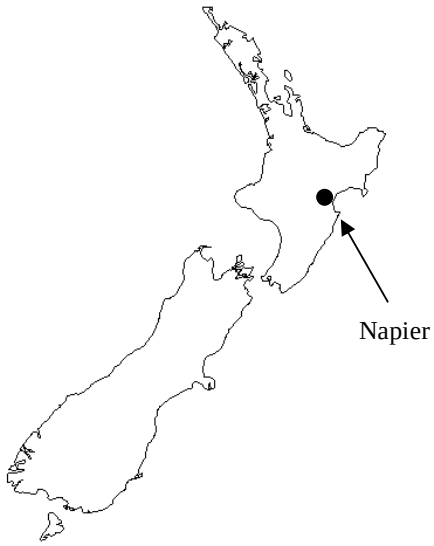

Figure 2. Map of New Zealand showing location of Napier.

3.1.1 Location of earthquake study

Napier, New Zealand. Napier (pop. 54,537) was selected for this study due to its unique geology and its susceptibility to multiple hazards (seismic, tsunami and volcanic). Napier has a history of damaging hazard activity, with an earthquake in 1931 destroying substantial parts of the city. The area surrounding Napier is one of the most seismically active in New Zealand, with 10 known active fault lines within the region which are believed to be capable of generating earthquakes with a magnitude of 7 on the Richter scale (CDEM, 2005). Napier has also received ashfall from volcanic event, such as the 1995/96 Mt. Ruapehu eruptions.

Napier's geology is such that seismic risk, in particular, is distributed evenly throughout the city. This is important. It means that the risk of experiencing seismic hazards (e.g., ground shaking, ground acceleration, liquefaction) is comparable for all

residents. Because residents face (objectively) equal levels of risk, differences in peoples' preparatory actions will result from how they interpret their relationships with these hazards and cannot be attributed to differences in their physical hazard status (which is the same for all residents). Consequently, the need to prepare for seismic hazard activity is the same for all, rendering the sampling easier.

To overcome the effects of adverse natural hazards and man made hazards (i.e. chemical, biological incidents) the Napier City Council has instituted several measures designed to inform residents of the associated risks and methods to alleviate the risk. For example, under the Civil Defence Act of 2002 it is a requirement of every local, district and regional council in New Zealand to design and maintain an up to date civil defence plan. This includes public education programs designed to utilise community competencies to facilitate a prompt return to normal social and economic way of life (CDEM, 2005). Councils are also obliged to recruit and train volunteers, and to appoint controllers to manage any civil defence emergency. The Napier City Council also owns and operates a system of sirens to alert the public in the event of any natural or man made hazard (with the exception of earthquakes). The council is currently in the process of instituting a process of testing the system to ensure its effectiveness in alerting the majority of citizens.

3.1.2 Method

Participants. A total of 1000 questionnaires were distributed to those households that were equally susceptible to experiencing adverse seismic hazard impacts. Certain areas of Napier (hills, high ground) are less susceptible to seismic hazards and would be less affected in the event of an earthquake. For this reason

those residents who lived in these areas were excluded from the study. A total of 266 (26.6%) were returned.

Materials. The Earthquake Survey Questionnaire (Paton et al., 2005) was used for this study. This survey was adapted from previous work relating to areas affected by volcanic activity. The survey has a total of 19 measures (see Appendix A). In the initial analysis stages (i.e. correlational matrices and inclusion in structural equation models) it was found that a majority of these measures did not make any significant contribution to the Social Predictor Model of Intentions to Prepare. As a consequence only those seven measures that made a meaningful contribution to the model will be described.

The items used to assess outcome expectancies were derived from work on the formation of behavioural intentions to adopt preventative nutrition strategies (Schwarzer & Renner, 2000). The four items related to negative outcome expectancies measured participants' beliefs that their actions could minimise the effects of earthquakes. Positive outcome expectancies were measured by four items with participants rating each statement in regard to the extent to which they believed that preparing for earthquakes would reduce damage to homes, improve living conditions and deal with disruptions to family and community life. Responses were measured on a 5 point Likert scale, with 1 = strongly disagree and 5 = strongly agree.

To help in assessing the social context within which hazard knowledge is formed five items relating to community participation were included. Measurement of community participation involved participants answering five questions regarding their active involvement in the community and was based on work by Eng and Parker (1994). Items were rated on a four point Likert scale, with 4 = often and 1 = never.

In order to assess a person's ability to articulate concerns and requirements relevant to hazard preparation four items relating to articulating problems were used. These items were derived from research by Speer and Peterson (2000) on developing an empowerment scale. Items were assessed on a five point Likert scale with 1 = strongly disagree and 5 = strongly agree.

Empowerment was measured by 4 items that asked participants to what extent they were involved in community activities, cognitively, emotionally and behaviourally. The sub-scale was derived from the work of Eng and Parker (1994) in evaluating a rural health community health program. Items were assessed on a five point Likert scale ranging from 1 = always perform the activity to 5 = not at all.

Respondents were also asked to rate their general level of trust in local government and the media. This scale encompassed five items assessed on a five point Likert scale that encompasses responses from 1 = strongly disagree to 5 = strongly agree. Items for this scale were derived from the work of Paton et al., (2005) in developing a social cognitive model of hazard preparedness.

The variable of intentions to prepare was used as an alternative to actual preparation activities as it is important to tap into those beliefs that represent an individual's deliberate intent to prepare, rather than assessing those actions that coincidently relate to preparing (e.g. after weekly shopping a person may have a supply of tinned goods on hand, but not specifically bought in the event of an earthquake) (Anderson-Berry, 2003; Paton et al., 2005).

Participants' intentions to prepare were measured by 22 items. The large number of items reflects the fact that preparing households against the effects of earthquakes requires many different activities (e.g. fastening household items to

walls/floors, securing foundations of homes, adequate supplies of bottled water/canned food). The header question asked “in the next month do you intend to...”? Responses were then elicited from the subsequent intentions items (e.g., “check your level of preparedness for earthquakes”, “increase your level of preparedness for earthquakes” and “become involved with a local group to discuss how to reduce damage or losses from earthquakes”). These statements were based on Bennett and Murphy’s (1997) work on the adoption of protective health behaviours. Responses were measured on a four point scale ranging from 1 = I will not do this to 4 = I have done this already. Descriptive information for the variables of the Social Predictor Model of Intentions to Prepare (Paton, 2006) is provided in Table 2.

Procedure. Information packs (see Appendix A) containing an information sheet relating to the survey, an information sheet and consent form relating to the interview phase of the study, approved by the University of Tasmania Human Ethics Committee, and the Community Earthquake Survey and a reply paid envelope were hand delivered to participants. The survey information sheet explained that participation in the survey was voluntary, and that completion of the questionnaire was indicative of consent to participate. Also included were an information sheet and consent form relating to the interview phase of the study. Participants were invited to extend their participation by taking part in a 20 to 30 minute telephone interview. It was explained that consent forms and questionnaires would be immediately separated on return. Those participants that chose to take part were required to complete and return the questionnaire and consent form via the enclosed self-addressed envelope. Contact telephone numbers of the Australian and New Zealand experimenters were provided for participants that had any questions regarding the study

3.2 Data analysis of the earthquake study

3.2.1 Missing data

Of the 1000 surveys distributed 266 (26.6%) were returned. According to Neuman (2000) a response rate of 10% - 50% is common for mail out surveys. Of the 266 questionnaires received three cases were excluded as no responses to survey questions were given. Of the remaining 263 questionnaires a further 5 cases were excluded as the responses for each of these cases totalled less than 50%. Dealing with missing data can be a problem as no firm guidelines exist regarding its exclusion (Hair Black, Babin, Anderson, & Tatham, 2006; Stevens, 2002; Tabachnick & Fidell, 2001). It has been suggested that if there are few cases with excessive levels of missing data, and are randomly distributed through the sample, then the exclusion of the cases may be the more efficient approach (Hair et al., 2006; Tabachnick & Fidell, 2001).

Univariate statistics showed that no systematic relationships existed between variables indicating there was no pattern to the missing data. For an overall assessment of randomness a Missing Completely At Random (MCAR) test was performed (χ^2 (19587) = 19729.345, p = 0.236). The non-significant finding indicates that there was no difference between the actual patterns of missing data and the expected randomly distributed missing data.

Missing data was replaced using means substitution. The means for each item of the questionnaire were calculated and substituted for the missing data. This approach was chosen in preference to an overall mean as a way of keeping reduction of variance to a minimum (Hair et al., 2006; Tabachnick & Fidell, 2001).

3.2.2 Outliers

No univariate outliers were found. However, 2 multivariate outliers were detected and deleted following calculations of the Mahalanobis distance for each case. In this procedure the distance of each case is measured from the centroid of the remaining cases (the centroid being the point at which the means of all the variables intersect). The distance is determined through the use of the χ^2 statistic. A case is considered an outlier if the probability of χ^2 for the Mahalanobis distance is less than 0.001.

3.2.3 Assumptions of normality, linearity, homoscedasticity and independence of errors

Assumptions of normality, linearity, homoscedasticity and independence of errors were found to be acceptable. These assumptions were assessed simultaneously by analysis of residuals. Multiple regression was used to provide a residuals scatterplot showing whether the residuals (differences between the actual and predicted dependent variable scores) met the assumptions of normality, linearity, homoscedasticity. Assumptions of the independence of errors were tested by the Durbin-Watson statistic. This statistic was non-significant indicating that the error deviations were uncorrelated.

3.2.4 Multicollinearity

All the items in the questionnaire were placed in a correlation matrix (see Table 1.) to examine the relationships between variables and to ascertain if items would be suitable for inclusion in the model. Table 1 shows that the correlations are moderate,

with the highest correlation $r = 0.47$ between intentions to prepare and positive outcome expectancies. The moderate correlations indicate that multicollinearity is not an issue with this data set, indicating that the variable do not contain redundant information.

Table 1.

Correlation Matrix of Social Predictors for Earthquake Affected Area.

	Negative outcome expectancies	Positive outcome expectancies	Intentions to prepare	Community participation	Articulate	Empowerment	General trust
Negative outcome expectancies	1.00	-.36**	-.38**	-.06	.03	-.01	.06
Positive outcome expectancies	-	1.00	.47**	.13*	.13*	.19**	.09
Intentions to prepare	-	-	1.00	.35**	.13*	.29**	.13*
Community participation	-	-	-	1.00	.21**	.46**	-.09
Articulate	-	-	-	-	1.00	.23**	.04
Empowerment	-	-	-	-	-	1.00	.21**
General trust	-	-	-	-	-	-	1.00

N = 256

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

3.2.5 Justification for Structural Equation Modelling

The central argument of the present study is that in making preparedness decisions individuals do not operate in a vacuum. It is argued that people use multiple social, community and institutional referents to validate their preparedness decisions. To assess the applicability of these proposed relationships and the interaction between individual and community factors structural equation modelling (SEM) will be used.

SEM is a multivariate analysis method that combines factor analysis, path analysis and multiple regression analysis. It is a statistical method that enables the testing of theory based models that attempt to explain the connections between

groups of variables (Barrett, 2007; Byrne, 2001; Hayduk, Cummings, Boadu, Pazderka-Robinson, & Boulianne, 2007; Hu & Bentler, 1999). This is an important difference with other general linear models. Procedures such as multiple regression, analysis of variance and correlation analyse specific relationships between constructs (Ho, 2000; Weston & Gore, 2006). In contrast, SEM assesses the model as a whole. This is an important factor when assessing the processes and connections people make in their decision making process. The present study is arguing that the decisions people make with regard to natural hazard preparation are based on their interactions with other members of the community and in the quality of their relationships with civic emergency management agencies. SEM enables the overall assessment of these multiple referent sources to provide an integrated picture of the reasoning process.

An important characteristic of SEM that distinguishes it from other general linear models is its ability to account for measurement error, thus improving statistical estimation of the hypothesised model (Byrne, 2000; Weston & Gore, 2006). With any form of measurement, either psychological or social, it is seldom possible to obtain perfect measurements of concepts, due to inaccurate participant responses or problems associated with describing the constructs under consideration. Consequently, moderate amounts of error are usually contained within measured variables. This has the potential of biasing results to an unknown degree or direction (Byrne, 2000). By using SEM to estimate hypothesised relationships measurement error contained within measured variables is accounted for, improving the estimation process and providing a more accurate model to fit the observed data.

3.2.6 Sample size

The sample size of 256 was acceptable for SEM analysis. This included 98 males, 154 females (with 3 missing cases) with a mean age of 55.68 (SD = 14.98, with 10 missing cases). While there are no absolute rules for sample size a number of guidelines are available. As SEM is a combination of factor analysis and multiple regression a large sample size is necessary. Hair et al. (2006) recommend that when using the maximum likelihood method 200 cases ensures stable solutions. As factor analysis is integrated in SEM Hair et al. and Ho (2000) suggest that the guide of 10 cases per variable is acceptable. In the case of SEM it is the ratio of 10 cases per parameters. For this analysis the model used included 25 parameters.

3.2.7 Goodness of fit indices

As SEM assesses the model as a whole this allows for the testing of the goodness of fit of the data to the hypothesised model, thus ascertaining the applicability of the model to the underlying theory (Barrett, 2007; Ho, 2000; Hu & Bentler, 1999). In essence SEM tests how well the hypothesised model fits the sample data. As the likelihood that the fit will be perfect is rare there will necessarily be a differential between the two. Goodness of fit indices measures the acceptability of this differential (Byrne, 2001).

The two most common ways of assessing the fit of the model is through the χ^2 goodness of fit statistic test and approximate fit indexes (Hu & Bentler, 1999). The chi-square (χ^2) statistic provides a measure of the degree of discrepancy between the models hypothesised population matrix and the actual observed covariance matrix (Barrett, 2007; Ho, 2000; Hu & Bentler, 1999). It assesses the difference between the

proposed model matrix and the observed matrix. For a model to be classed as a good fit there should be a non-significant difference between the matrices (Hayduk et al., 2007). However, the chi-squared statistic is extremely sensitive to large sample sizes and departures from multivariate normality. This may result in a hypothesised model failing to fit the data (Barrett, 2007). Approximate fit indices provide different types of information regarding model fit and can be used to supplement the information provided by the chi-squared statistic in assessing the degree of model fit (Markland, 2007; Miles & Shevlin, 2007).

The Goodness of Fit Index (GFI) and the Adjusted Goodness of Fit (AGFI) can be classified as absolute indexes of fit as it compares the hypothesised model with no model at all. The Normed Fit Index (NFI), the Comparative Fit Index (CFI) and the Relative Fit Index (RFI) are examples of incremental fit indices. These are derived from comparing the hypothesised model with a model that is independent of variables in the model, providing a complete measure of covariation with the data.

A model that hypothesises that observed variables are uncorrelated is typically used as a baseline measure (Hu & Bentler, 1999). The Root Mean Square Error of Approximation (RMSEA) accounts for the error of approximation in the population and is a measure of the discrepancy per degree of freedom. This makes the RMSEA particularly sensitive to the complexity of SEM models. While there is no rule regarding cut off values for fit indices Hu and Bentler have suggested that absolute and incremental fit indices approximating 0.95 and RMSEA values near to .06 are useful guides.

It is important to point out that threshold levels for fit indices are a guide only. Several recent studies have argued against absolute threshold levels due to the lack of

empirical evidence (e.g. Barrett, 2007; Markland, 2007; McIntosh, 2007; Millsap, 2007; Mulaik, 2007). Steiger (2007) has argued that cut off values for fit indices have no real relevance to the modelling process. According to Steiger this is due to the differences that exist between observed and fitted covariance matrices. As Miles and Shevlin (2007) have noted the chi-squared statistic cannot be relied on alone to provide goodness of fit information. The use of other fit indices provides alternative information in interpreting the chi-squared statistic. The modelling analysis was conducted by using the AMOS 6.0 structural equation modelling program and the findings are summarised in Figure 3.

3.2.8 Results of earthquake study

The model provided an adequate fit for the data. The chi-squared and goodness of fit indices are shown in Table 5. Correlations are signified by the double headed arrows. The single headed arrows show the direction of the causal relationships. All the pathways shown in the model are significant with the exception of the correlation between negative outcome expectancies and community participation.

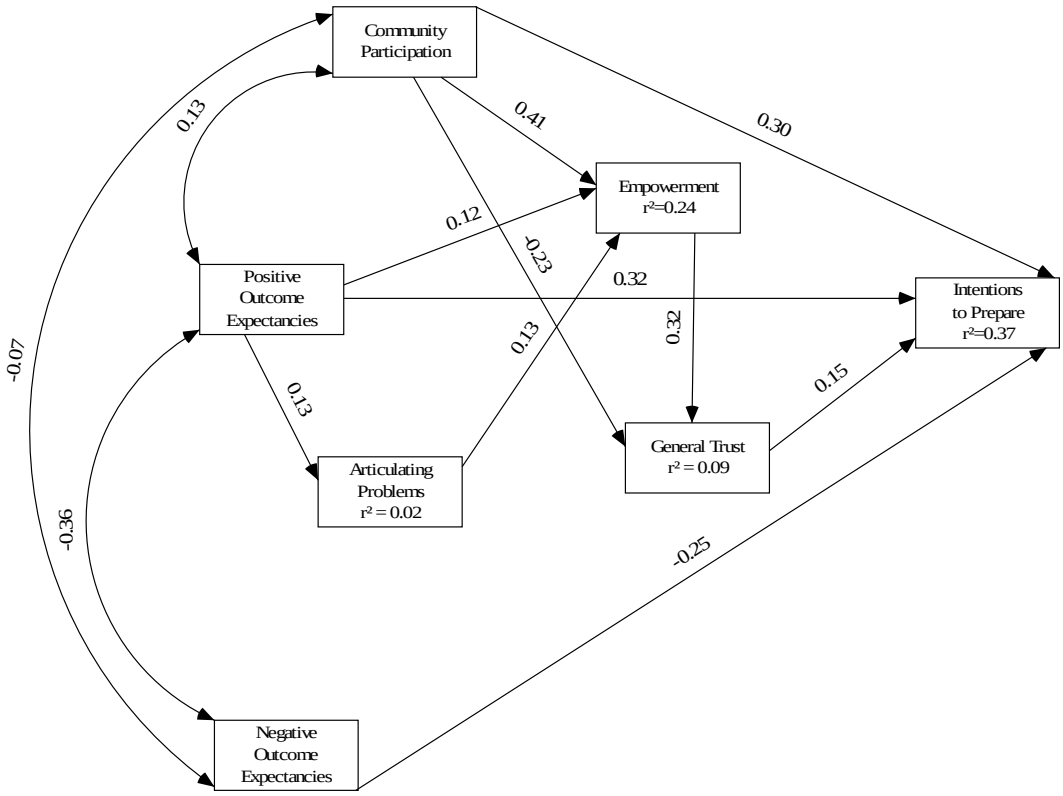

Figure 3. Social predictor model of intentions to prepare for earthquakes (Paton, 2006).

The process starts with positive and negative outcome expectancies and progresses sequentially to intentions to prepare. The numbers adjacent to each causal arrow indicate the strength of the relationship (the closer the number is to 1 the stronger the relationship). A minus sign indicates an inverse relationship. For example, positive outcome expectancies predict intentions to prepare, empowerment and articulating problems. An increase in negative outcome expectancies is associated with a decrease in intentions to prepare for earthquakes. The r^2 number indicates percentage of the overall model variance that is explained by that variable. This demonstrates that individual, community and societal factors combine to account for 37% of the variance in intentions to prepare.

3.3 Flood study

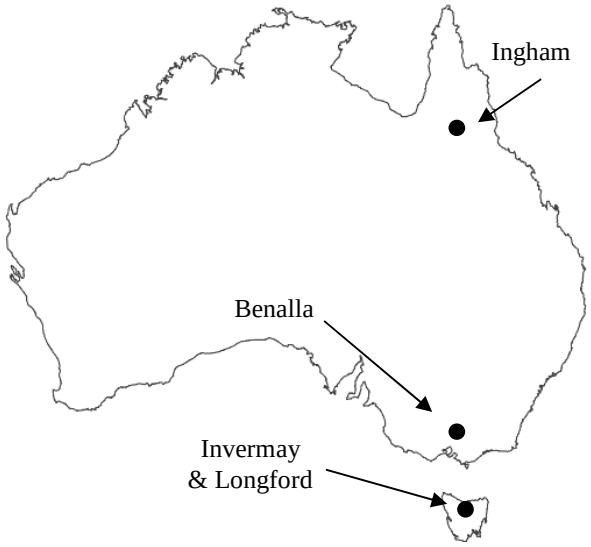

Figure 4. Map of Australia showing locations of the flood study.

3.3.1 Locations for the flood study

Invermay, Launceston. Launceston (pop. 74, 235) is located in the North East of Tasmania and is particularly susceptible to flooding as it is situated at the confluence of three rivers, the Tamar, North Esk and South Esk Rivers. These rivers are fed by a system of rivers and lakes that cover approximately 14% of Tasmania. Launceston has been affected by a number of major floods, in particular 1929 and 1960. This has necessitated the construction of a number of levees in order to alleviate the effects of flooding. The suburb of Invermay (pop. 2997) is located in the centre of Launceston, and is one of the areas to be surveyed. Most of Invermay is sited within a flood plain, the area that will flood in a natural river system. A large proportion of Invermay is below sea level, making it particularly susceptible to the consequences of major flooding (Launceston City Council, 2006).

Longford, Tasmania. Longford (pop. 2829) is located in the South Esk Basin, the largest water catchment area in Tasmania covering an area of 8900 km^2 (Fallon, Fuller & Graham, 2000). The rivers within this catchment area can, at various times, have 12% of Tasmania's run off water flowing through them. In times of heavy rains Longford is particularly susceptible to floods as it is sited at the confluence of two rivers, the Macquarie and South Esk. This area is itself located in the upper area of a large floodplain, the Hadspan Retarding Basin. When river levels are high (e.g. heavy rains) water can back up considerably in the Macquarie River and spread out downstream towards Longford (Fallon et al., 2000). The Northern Midlands Council (2006) has estimated that a 1-in -100 year flood event would cause approx. $13.6M worth of damage. A 1-in-20 year occurrence would necessitate 30% (up to 780 people) of the residents of Longford needing to be evacuated.

Benalla, Victoria. Benalla (pop. 9561) is located approximately 167kms North-East from the city of Melbourne. Benalla is located within the Goulburn Broken catchment area, consisting of the Goulburn and Broken Rivers' catchment area and covers 2, 391,544 hectares, or 10.5% of Victoria's total land area. The catchment is part of the Murray Darling Basin and while it only makes up 2% of the basin it provides 11% of its stream flow. Benalla is situated on the Broken River, a part of the Broken River catchment area. This catchment covers an area of 772,386 hectares, or 3.4% of Victoria's land area, and has a mean annual flow of 325,000 ML (Goulburn Broken Catchment Management Authority, 2002). In October 1993 Benalla was subjected to most severe flooding in more than a 100 years. Following 2 consecutive nights of heavy rainfall 12 mountain fed rivers flooded on the North-East and South-East sides of the Victorian Alps, causing 4000 people (1500 from Benalla and

surrounds) to be evacuated and resulting in an estimated $350 million cost to Victoria (Emergency Management Australia, 2006).

Ingham, Queensland. Ingham (pop. 4673) is approximately 100 km north of Townsville, QLD. According to the Bureau of Meteorology (2006) seven major floods have occurred in and around Ingham since 1990. Ingham is located within the Herbert River catchment area. This region drains an area of approximately 10,000 kms^2 to the Coral Sea, and is the largest river system located in Australia's tropical North East. Flood producing rainfalls (over 600mm falling within a few days) generally occur in the lower part of the catchment area. As Ingham is situated in this area, and is sited on the floodplain of the Herbert River, makes it particularly susceptible to flooding. The Herbert River reacts very quickly to heavy rainfall resulting in rapid rises in river height and velocities. A number of natural watercourses are located in and around Ingham. In times of flood these natural features distribute a large amount of water around Ingham, making over three quarters of the town at risk of suffering the effects of flooding (Bureau of Meteorology, 2006).

3.3.2 Method

Participants. A total of 3500 questionnaires were sent to Invermay, Benalla, Ingham and Longford. Questionnaires were delivered to those households that would be directly affected in the event of a major flood event. This assessment was based on local flood maps obtained from relevant local authorities that showed expected water levels in the event of a flood event (Ingham - Hinchinbrook Shire Council; Longford - Department of Primary Industries and Water, Water Assessment Branch, Tasmanian

Government; Invermay – Launceston City Council, Benalla – Department of Planning and Community Development, Victorian State Government).

Questionnaires were delivered to households in the months that flood events were not expected to occur (Ingham & Longford - October 2006, Invermay & Benalla – July/August 2007). This is important as the infrequent nature of natural hazards necessitates effective preparation occurring pre-hazard times (Morrissey & Reser, 2003; Lindell & Prater, 2003). Choosing these particular time frames allows for the assessment of the degree of salience that people attach to flood issues, both the physical aspects of preparing and the extent to which people are thinking and talking about these issues.

Materials. The Flood Survey Questionnaire (Paton et al., 2005) (see Appendix B) was amended from the earthquake survey so that items referred to floods rather than earthquakes. The intention to prepare scale was reduced from 22 to five items. As mentioned previously there are many more activities to perform for earthquake preparedness compared to flood preparation. Given that earthquakes are unpredictable in occurrence and magnitude more contingencies need to be considered when making hazard adjustments. In essence flood preparation requires individuals packing up essential items and evacuating. Descriptive information for the variables of the Social Predictor Model of Intentions to Prepare (Paton, 2006) is provided in Table 2. The questionnaire sent to participants contained 18 measures. As explained in the materials section of the earthquake study (see section 3.1.2 Method) only those measures that contributed meaningfully will be presented.

Procedure. The procedure for this study was the same as for the Napier study with the exceptions that the contact details of the Australian experimenters only were provided.

Table 2.

Means, Standard Deviations and Cronbach's Alpha of the Social Predictor Model of Intentions to Prepare (Paton, 2006) Variables.

	Earthquake study				Flood study			
	M	S.D.	(α)	Range	M	S.D.	(α)	Range
Positive outcome expectancies	13.22	2.56	0.69	4 - 20	13.49	3.48	0.86	4 – 20
Negative outcome expectancies	9.24	2.66	0.65	4 - 16	9.84	3.13	0.65	4 - 20
Intentions to prepare	42.87	13.33	0.94	22 - 82	9.34	3.62	0.90	5 - 20
Community participation	13.55	3.54	0.81	5 - 20	3.62	3.79	0.81	5 - 20
Articulating problems	14.21	2.11	0.67	6 - 20	14.71	2.05	0.55	8 - 20
Empowerment	10.21	2.58	0.77	4 - 20	10.16	3.13	0.82	4 - 20
General trust	16.32	3.36	0.80	6 - 25	14.97	4.13	0.84	5 - 25

Note (n: Earthquake study = 256, Flood study = 264)

3.4 Data analysis for flood study

The raw data was collected from questionnaires received from the four locations. A total of 304 questionnaires were returned. See Table 3 for a breakdown of questionnaire received from each location. Reminder letters were sent to Benalla and Invermay two weeks after initial delivery of the questionnaires. No reminder letters were sent to Ingham and Longford due to the small initial returns and a lack of resources. The low rate of returns was a concern. This could indicate that those people who did not complete the questionnaire are not aware of the potential risk of

flood in their area. It may also indicate that other factors (e.g. family, work, health) take precedence when allocating physical and cognitive resources. These issues will be discussed more fully in the following chapters.

Table 3.
The Number of Questionnaires Received from Each of the Flood Affected Areas.

	Surveys delivered	Surveys returned	Surveys completed
Benalla	1000	109	92
Invermay	1000	124	119
Ingham	1000	43	39
Longford	500	33	21
Total	3500	307	271

3.4.1 Missing data

Of the 271 questionnaires available for analysis 3 were excluded due to responses for each of the cases being less than 50% in accordance with the previously mention guidelines. The missing data was found to be randomly distributed. No systematic relationships were found between variables and the MCAR test (χ^2 (3536) = 3635.054, p = 0.120) showed an overall randomness to the data set. Again mean substitution was used to replace missing data.

3.4.2 Outliers and test of assumptions of normality, linearity, homoscedasticity and independence of errors

No univariate outliers were detected. Mahalanobis distance calculations found four multivariate outliers which were excluded. Tests of assumptions of normality, linearity, homoscedasticity were carried out via multiple regression and found to be acceptable. A non-significant Durbin-Watson statistic indicated independence of errors.

3.4.3 Multicollinearity

Table 4 shows that the correlations are moderate, with the highest correlation (r = 0.66) between community participation and empowerment. The moderate correlations indicate that multicollinearity is not an issue with this data set.

Table 4.

Correlation Matrix between Social Variables for Flood Affected Areas.

	Negative outcome expectancies	Positive outcome expectancies	Intentions to prepare	Community participation	Articulate	Empowerment	General trust
Negative outcome expectancies	1.00	-.23**	-.25**	-.19**	-.08	-.23**	.01
Positive outcome expectancies	-	1.00	.35**	.18**	.21**	.24**	.26**
Intentions to prepare	-	-	1.00	.26**	.16**	.29**	.20**
Community participation	-	-	-	1.00	.28**	.66**	.10
Articulate	-	-	-	-	1.00	.32**	.15*
Empowerment	-	-	-	-	-	1.00	.29**
General trust	-	-	-	-	-	-	1.00

N = 264

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

3.4.4 Sample size

The sample size of 264 was acceptable for SEM analysis. This included 128 males, 125 females with (11 missing cases) and a mean age of 53.80 (SD = 17, with 14 missing cases). This was based on the previously discussed guideline of 10 cases for each parameter (Hair et al., 2006; Ho, 2000). The model used included 25 parameters. The modelling analysis was conducted by using the AMOS 6.0 structural equation modelling program and is shown in Figure 5.

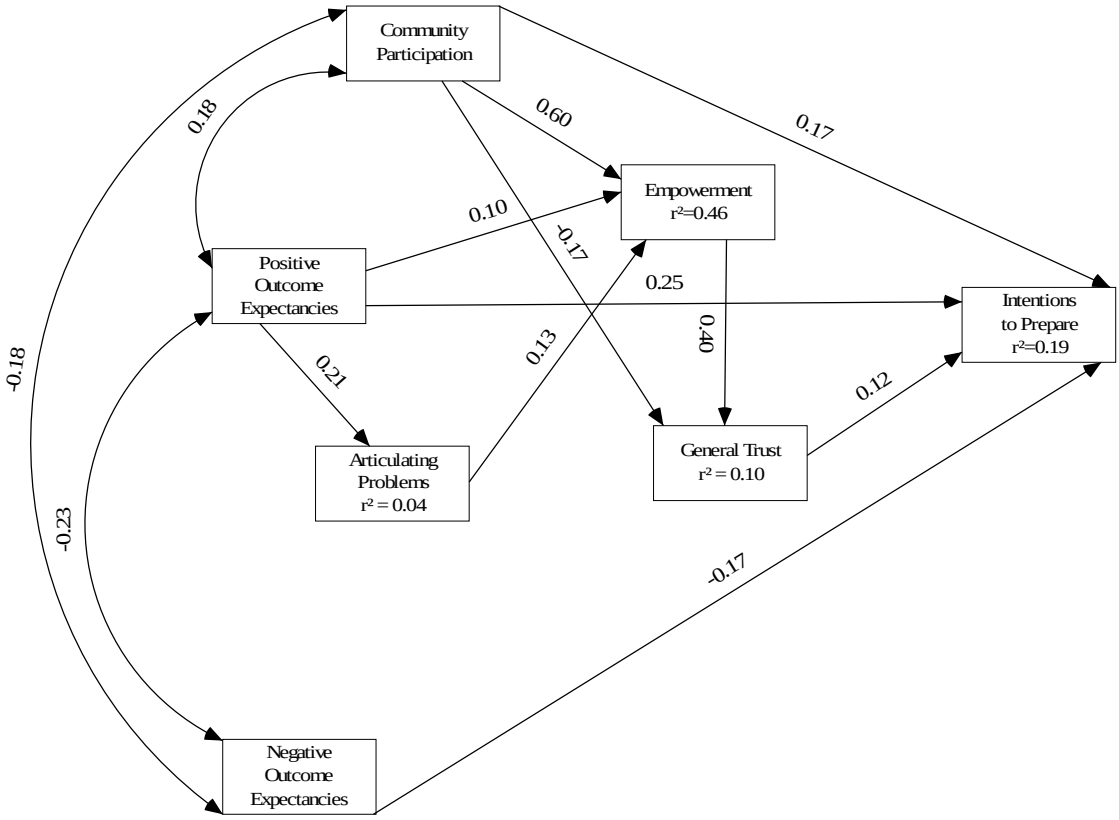

Figure 5. Social predictor of intentions to prepare for floods (significant χ^2) (Paton, 2006).

3.4.5 Results of the flood study

The significance of the χ^2 statistic indicates that the model did not provide an adequate fit for the data. The chi-squared and goodness of fit indices are shown in Table 5.

Table 5.
Chi-Squared and Goodness of Fit Indices for Earthquake and Flood Studies.

	Napier	Combined flood (significant χ^2)	Combined flood (non-significant χ^2)
χ^2	6.757	21.217	9.583
df	7	7	6
p	0.455	0.003	0.143
GFI/AGFI	0.99/0.97	0.99/0.91	0.99/0.95
NFI	0.97	0.94	0.97
RFI	0.93	0.81	0.90
RMSEA	0.0001	0.088	0.048
(90%)	(0.0001-0.075)	(0.047-0.132)	(0.0001-0.101)
P – value for closeness of fit (RMSEA<0.05)	0.790	0.063	0.462

Note (n Napier = 256, Combined = 264)

To further explore the utility of the Social Predictor Model of Intentions to Prepare (Paton, 2006) in predicting intentions to prepare for floods an alteration was made via modification indices. This analysis provides various potential modifications that may result in smaller chi-squared statistics (Arbuckle, 2005). The modification indices for this analysis showed that a path from positive outcome expectancies to general trust would lead to a reduced chi square value. This path was chosen as

people who hold positive outcome expectancies see hazard preparing issues as being more salient resulting in a greater need for relevant information. The consequence of this can be a specific information search. If people consult relevant authorities and receive the information that they need then an increase in trust is more likely (Paton, 2008). The amended model is summarised in Figure 6.

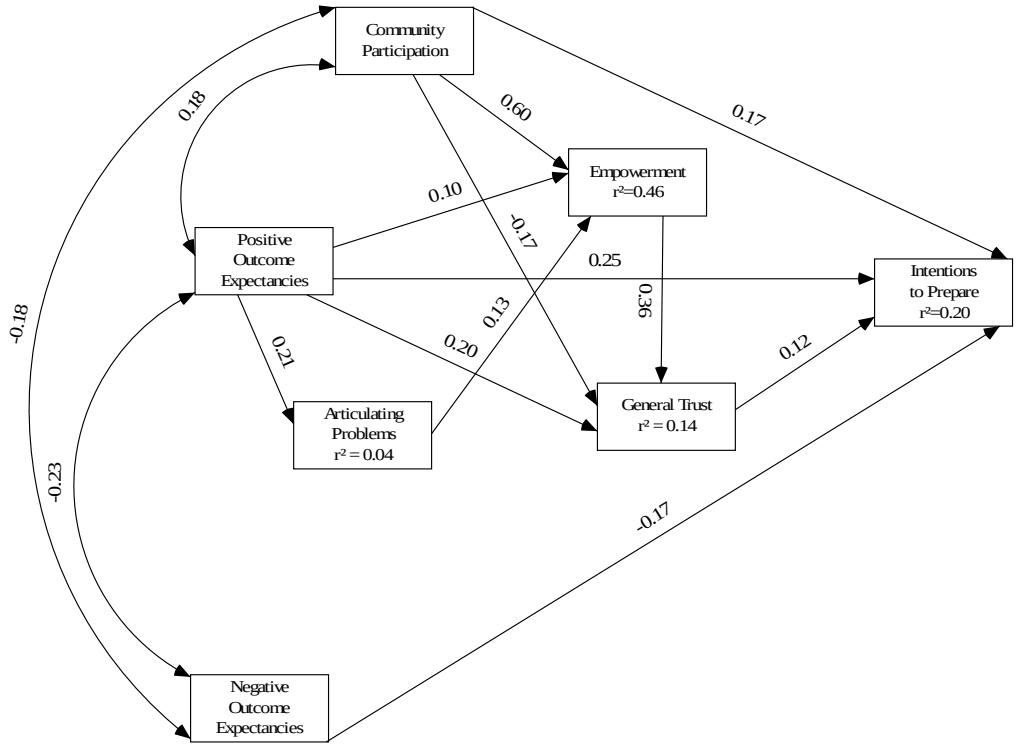

Figure 6. Social predictor of intentions to prepare for floods (amended) (Paton, 2006).

The model provided an adequate fit for the data (see Table 5 for chi-square and goodness of fit indices). All the pathways shown in the model are significant. The model demonstrates the influences of social environmental factors in decision making

with intentions to prepare accounting for 20% of the overall variance. The model also confirmed the role of general trust in mediating individual, community factors and intentions to prepare. The model also shows that for the flood affected areas empowerment accounts for 47% of the total amount of variance in the model.

3.5 Discussion

3.5.1 All-hazards approach

The results of the present study provided support for the applicability of the Social Predictor Model of Intentions to Prepare (Paton, 2006) to a diverse range of natural hazards (volcanic activity, floods and earthquakes). This is an important finding as the ability for a social cognitive model to demonstrate an all-hazards approach enables emergency management planners to utilise resources in a more efficient and economical manner (Alexander, 2005; Dufty, 2008). The need for a more efficient and economical approach has been noted by Scanlon, McMahon and van Haastert (2007) when discussing approaches to dealing with mass death following natural disasters and pandemics. Scanlon et al. point out that combining the responses of emergency management authorities and health personnel would be more effective than treating these events as separate entities.

Adopting an all-hazards approach can help to ensure a consistency in preparedness information that is disseminated to individuals and communities (Dufty, 2008). The importance of consistent information was highlighted by Ronan, Paton, Johnston and Houghton (2000). Following the 1995 eruption of the Mt. Ruapehu volcano (New Zealand), people sought out information using a range of sources, from family and friends to several emergency management agencies. No one source was

preferred over another, the context decided which source was consulted. According to Ronan et al. this has implications for the delivery of preparedness information. If multiple agencies are delivering the information it needs to be ensured that they are delivering common information.

3.5.2 The social environment

The findings of the present study confirm the role of the social predictor variables in the decision making process that people engage in when deciding on natural hazard preparation. The variables identified by the Social Predictor Model of Intentions to Prepare (Paton, 2006) are important factors in the reasoning processes that people engage in when deciding on adopting hazard mitigation procedures. The data shows that individual, community and institutional factors play a key role in people's decisions concerning the efficacy of adopting natural hazard mitigation strategies. What the models for both earthquake and flood affected areas show is that the decision making process is linked to the social environment within which people operate.

The results supported similar work on the Social Predictor Model of Intentions to Prepare (Paton, 2006) in relation to areas affected by volcanic activity (Paton, Smith et al., 2008). Paton Smith et al. highlighted the importance of the social environment within which preparedness decisions are made. The model demonstrated that it was in the interaction of individual, community and institutional factors that successful delivery of volcanic hazard mitigation strategies was possible. Importantly, Paton Smith et al. found that this interaction of societal processes was an integral factor of the social environment within which preparedness decisions are

made. It was the quality of this relationship between communities and agencies responsible for risk management and public education that informed people's awareness and motivation regarding hazard preparation.

The finding that the social environment informs people's attitudes to natural hazard preparation is an important consideration for the delivery of hazard mitigation strategies by civic emergency authorities. The data indicates that natural hazard preparation involves more than just making information available. It requires emergency management authorities to actively engage with communities to fully understand the attitudes and influences that are unique to that community. To provide a more complete picture of the individual and societal processes that can influence hazard preparation decisions a review of the findings regarding each variable of the model will now be presented.

3.5.3 Outcome expectancies

The Social Predictor Model of Intentions to Prepare (Paton, 2006) confirmed the key role of outcome expectancies in assessing the motivational level of people in deciding to prepare for natural hazards, demonstrating the efficacy of engaging people in the preparation process. Outcome expectancies provide a way of assessing whether individuals will form intentions to prepare themselves and their households against the consequences of natural hazards (Paton Smith et al., 2008). The role of both positive and negative outcome expectancies demonstrates that decision to prepare or not prepare for natural hazards are indicative of separate reasoning pathways.

Positive outcome expectancies. The data indicated that positive outcome expectancies were found to directly influence intentions to prepare. This shows that when making preparedness decisions individuals who perceive that the effects of hazards are controllable, and have the belief that they have the capacity to prepare for it, are more likely to adopt protective measures to safeguard themselves from the effects of natural hazards. This supports previous studies that have shown the role of positive outcome expectancies in predicting preparation activities (e.g. Karanci et al., 2005; Paton, Houghton et al., 2008; Vogt et al., 2005). Paton, Burgelt et al. (2008) have identified the role of positive outcome expectancies in predicting people's intentions to prepare for bushfires. Paton Burgelt et al. found that those people exhibiting high positive outcome expectancies believed that bushfire preparation was worthwhile and also demonstrated a high degree of knowledge of fire and the antecedence of bushfires.

As a way of increasing outcome expectancies mitigation agencies could conduct programs designed to raise the awareness of individuals as to what can be done to reduce the potentially devastating affects of natural hazards. Advocating the benefits of preparing can help to reduce the uncertainty associated with the effects of natural hazards and increase the positive beliefs regarding the efficacy of adopting protective measures (Slovic & Peters, 2006). Karanci et al. (2005) have reported a degree of success with a program designed to demonstrate to people the efficacy of protective measures with regard to earthquakes. Following the program Karanci et al. found that participants were better prepared cognitively to face future hazards through a heightened belief in the efficacy of mitigation procedures and preparedness. Developing positive outcome expectancies in individuals can motivate people to form

intentions to prepare. In the absence of outcome expectancies people may acknowledge that a particular natural event is hazardous, but without some initial motivation the perception of risk will not lead to intentions to prepare.

Negative outcome expectancies. Negative outcome expectancies were found to be associated with intentions not to prepare for natural hazards. This indicates that people who believe that earthquakes and floods are too destructive to prepare for and that they themselves do not believe that they have the capacity to do anything about them are less likely to develop intentions to prepare for the hazards.

The indication here is that people who decide not to prepare for natural hazards are engaging in reasoning processes that are distinct from positive decision making. Paton, Burgelt et al. (2008) have found evidence of this separation of reasoning pathways regarding bushfire preparedness decisions. People who decided not to prepare themselves and their households against bushfire threat were found to have little sense of community. They were unlikely to engage with the community on the issue of bushfire preparedness. What this indicates is that decisions to prepare or not to prepare are related to the social environment that surrounds individuals and communities.

This has implications for the delivery of hazard mitigation information. It is not enough to simply make this information accessible. Civic emergency management authorities need to encourage community attachment and to promote the effectiveness of natural hazard protective measures. Data shown in Table 2 indicates that there are reliability issues concerning this variable. This suggests that the variable of negative outcome expectancy may be accessing other similar processes. For example, this variable might also be tapping into beliefs regarding fatalism. This makes

interpretation of this data difficult. Outcome expectancies were included to examine those objective, cognitive evaluations of protective actions that help to safeguard the self and the household. Fatalism is tapping into those disposition beliefs regarding the threat of the hazard itself. If it is the case that the variable of negative outcome expectancies is being confounded with fatalism then future uses of the model need to include a way of differentiating between these variables. This issue is further explored in Chapter 5.

3.5.4 Community participation and articulating problems

The findings of the Social Predictor model of Intentions to Prepare (Paton, 2006) demonstrate the role of community participation in predicting intentions to prepare for natural hazards. In both earthquake and flood areas community participation predicted intentions to prepare and empowerment. This finding highlights the social aspect of preparing. Community participation provides a context for discussions among those people who share similar values and beliefs and helps to reinforce their perceptions of natural hazards and hazard mitigation choices. The reciprocal relationship identified in the model between positive outcome expectancies and community participation indicates that interaction with other like minded people allows for assessment of the benefits associated with preparing and identifying available community resources (Dufty, 2008; Gissing, Morgan, & Ronan, 2007; Karanci et al., 2005).

The use of general community variables (charity work, volunteering, assisting others etc.) to assess community involvement highlights the degree to which incorporating environmental hazard preparedness into daily activities can facilitate

preparing. As was discussed previously (Chapter 2), when faced with the uncertainty associated with natural hazards the community factors that people draw on when making preparedness decisions will be based on their general day to day experiences. This finding supports that of Paton et al., (2009) who tested a version of the Social Predictor Model of Intentions to Prepare (Paton, 2006) on tsunami preparation and found that the social environment is an influence on intentions to prepare. Combined with the findings of the present study this lends further support to applicability of the model in an all-hazards context.

In both earthquake and flood models positive outcome expectancies predicted articulating problems. This suggests that as people come to believe that their actions can minimise the consequences of natural hazards they will seek more specialised advice. However, while this relationship was significant it needs to be treated with caution as Figures 3 and 6 show that articulating problems explained only a small amount of the total variance. There were also issues concerning reliability (see Table 2). This can be explained by the general measure of articulating problems that was used. As has been explained these general measures were used to account for the day to day experiences within which people receive and process natural hazard threat information. The general nature of the measure could have excluded references to specific issues related to natural hazard problem solving. This may mean that future uses of the model need to include a measure of articulating problems that is directed more toward natural hazard issues.

However, the data does provide some further evidence that people will avail themselves of more specialised advice when community sources of information are insufficient. The earthquake and flood models showed a negative pathway between

community participation and general trust, indicating that as general trust in authorities increases so community participation decreases. In times of uncertainty (i.e. natural hazard events) people are motived to obtain information that is specific to their needs (Lion et al., 2002). The information sources that people access can be either formal or informal (Briggs & Stern, 2007). The community participation variable was tapping into those informal sources that represented people's everyday social experiences. The negative relationship with general trust could be tapping into that stage of preparing where people need more specific and relevant information to further aid in their preparation.

Taken together these data support the inclusion of community input and community capacities in hazard mitigation programs. The advantages of incorporating community participation and competencies into hazard mitigation programs have been reported on by Gissing et al. (2007). Following floods in the NSW town of Eugowra town meetings were held at which residents expressed displeasure at the lack of community consultation regarding emergency plans, evacuation, and the lack of consistency and relevance of information. Following consultative meetings a new emergency plan was formulated that took into account community and practical concerns and presented up-dated and relevant information. Making the process transparent and incorporating community input resulted in people being more aware of the risks of floods and the preventative measures that are in place. As the community now has ownership of the plan it now reflects the behaviour of the community. What this demonstrates is that by becoming involved in community activities people are able to articulate ways of alleviating the effects of natural hazards through community activities. Being able to articulate specific

concerns and transferring this into salient questions helps in more resilient communities.

3.5.5 Empowerment.

The findings of the model demonstrate that empowerment was predicted by positive outcome expectancies, community participation and articulating problems. The empowerment variable accounted for 24% of the variance in the earthquake model and 46% in the flood model. The finding that empowerment also predicted trust confirms the role of empowerment in reflecting the quality of the relationships between individuals and between the community and institutions. This is important as when dealing with natural hazards people are faced with uncertain situations. To overcome this uncertainty people will turn to authorities. Empowerment is representative of the quality of the relationship between members of the public and civic emergency management agencies. A high level of empowerment indicates that a trusting relationship exists between the public and emergencies management agencies.

3.5.6 Trust

The model provided moderate support for role of trust in mediating the relationships between intentions to prepare and those community influences that interact to produce community engagement and risk reduction beliefs. General trust was predicted by empowerment and community participation, and in the flood data by positive outcome expectancies. Like articulating problems the amount of variance explained was small. Again this can be explained be the general nature of the trust

scale. As with all the variables it was general considerations that were being assessed to ascertain whether daily experiences could be co-opted for natural hazard preparation.

The data demonstrates the key role of general trust in mediating individual, community and societal processes and intentions to prepare. This suggests that how people perceive the relationship between themselves and civic emergency authorities can determine preparedness activities. This relationship is important. When dealing with the uncertainty caused by natural hazards people consult trusted sources of information in an effort to reduce this uncertainty. If individuals have trust in emergency management authorities then they are more likely to attend to them in situations of high uncertainty (Deurenberg-Yap et al., 2005; Pfister, 2002). Following a flood event in Grafton NSW Pfister found that approximately three quarters of the residents who evacuated did not necessary believe that Grafton would be flooded. This suggests that residents were aware of the inherent uncertainty associated with natural hazards and so were disposed to trust in official precautionary announcements. In this situation people are more attentive to the procedures of particular institutions. If the process is perceived as fair, and institutions treat communities fairly and with respect, people are more likely to trust that institution (De Cremer & Blader, 2006; De Cremer, Tyler, & Den Ouden, 2005; Tyler & Blader, 2003).

3.6 Implications

The findings of the present study confirm the applicability of the Social Predictor Model of Intentions to Prepare (Paton, 2006) in assessing people's

influences in preparing for natural hazards. The model demonstrates the interaction of individual, community and institutional factors in influencing the decision making process in adopting, or not adopting, natural hazard mitigation strategies. It shows that the social environment within which people received, discuss and act on hazard threat information is a major influence on the formation of intentions to prepare for natural hazards.

This is an important implication for the delivery of harm minimisation programs. Civic emergency management agencies seldom utilise community competencies and processes to specifically combat hazard threats (Paton et al., 2009). Similarly, community groups are rarely organised with the sole purpose of addressing natural hazard issues. This argues for a more interactive process between hazard management authorities and communities. Developing pre-existing community competencies to facilitate greater community awareness and discussion of hazard issues make it more likely that people will adopt preparedness activities (Paton, 2006).

The finding that the general nature of the measures was applicable across multiple locations and for multiple natural hazards argues for the utility of the model in an all-hazard capacity. This is important in the context of the delivery of hazard mitigation information. By giving the framework by which this information is delivered a certain amount of homogeneity helps to ensure consistency and that the process is efficient and economical.

However, it needs to be remembered that natural hazards, and at risk communities, each have unique characteristics that need to be considered. While the model showed that intentions to prepare are embedded in the surrounding social

environment it is not clear exactly what individuals are specifically referring to when addressing these variables. A more detailed examination is of these processes is needed. For this reason a qualitative component was added. The following chapter will detail the interview process, how the subsequent data was applied to each of the variables of the Social Predictor Model of Intentions to Prepare (Paton, 2006) and reveal the specific referents that constitute the social context within which natural hazard cognitions are constructed and maintained.

Chapter Four

The quantitative component of the study provided a valuable insight into individuals' decision making process with the finding that decisions relating to natural hazard preparation are situated within the social environment. The finding that the Social Predictor Model of Intentions to Prepare (Paton, 2006) was applicable in predicting levels of intention to prepare in both earthquake and flood affected areas demonstrated that the social environment is a common reference point for preparedness decisions.

This is an important finding for the dissemination of hazard preparation strategies. Factors such as disparities in socio-economic backgrounds, geographical locations and cultural differences make it vital that hazard mitigation messages are framed in such a way that addresses the specific needs of community member (Drottz-Sjöberg, 2000; Maguire & Hagan, 2007). That is, effective hazard mitigation programs recognise the fact that people receive, interpret and act upon information regarding natural hazards within the social context (e.g. work, home life, community activities) that is part of their everyday life (Paton et al., 2009). This argues for a more thorough understanding of the relationships between individuals, communities and civic emergency management authorities in regards to natural hazard preparation.

While the Social Predictor Model of Intentions to Prepare (Paton, 2006) provided valuable information on generic community and societal factors that are common to different areas and for different hazards it could not tap into those characteristic and concerns that are unique for a given location and for a particular hazard. Nor could it provide any direction for the future development of work into social context influences on, for example, preparedness motivation, reticence about

preparing, interpretation or decision making processes. The present chapter will expand on the findings of Chapter 3 by introducing a qualitative component to further explore the social context within which individuals assess and assign meaning to natural hazard information. Utilising a mixed methods approach assists in providing a more detailed picture of how responses to the quantitative data originated, in other words to try to understand what people are thinking in relation to preparing for natural hazards.

Adopting a mixed method approach provides a richer understanding of the reasons behind an individual adopting, or not adopting, protective measures. A quantitative approach allows for general descriptions of situations in a standardised and objective way, thus assisting in answering research questions in a methodical fashion (Punch, 2005). The inclusion of a qualitative component can facilitate the identification and interpretation of what it is that people are thinking and what has influenced their interpretation and responses to a set of proscriptive questions. The adaptability of qualitative research in a diverse range of situations makes it a suitable method for studying social relationships in a natural setting (Denzin & Lincoln, 2003).

Combining both quantitative and qualitative methods permits a more complete picture of the situation under investigation to emerge. Cresswell (2003) has presented two approaches to combining quantitative and qualitative data. In a sequential procedure the findings of one method are expanded by the introduction of another. In this approach the focus is on explaining and interpreting the relationships that exist within the phenomena under investigation. The present study seeks to do this by introducing a qualitative component in order to better understand the relationships

identified by the Social Predictor Model of Intentions to Prepare (Paton, 2006). A further method advanced by Cresswell for providing a more complete analysis is a concurrent approach. In this approach two separate methods (i.e. quantitative and qualitative) are used to confirm the findings of a single study. Having convergent sources of data lends support to the validity of the study. Assessing the level of consistency in the findings was a further reason for the present study including a qualitative component.

This chapter will present the findings of the qualitative study by firstly explaining the rationale for using a qualitative approach in general and Means-End Chain (Gutman, 1982; 1997) theory in particular. This will be introduced more fully below. Means-End Chain provided the framework by which the interviews were conducted, and explains why people view particular consequences and personal values as being important. The qualitative data will then be matched to the stages (individual, community and social) of the Social Predictor Model of Intentions to Prepare (Paton, 2006) to provide more detailed information regarding what specific aspects of the social environment influences preparation activities.

4.1 Rationale for including a qualitative approach

Interpretation is at the centre of qualitative research (Liamputtong & Ezzy, 2005). Qualitative research methods seek to understand reality as perceived by the individual (Denzin & Lincoln, 2003). It seeks to contextualise the experiences and actions of individuals and provide detailed analysis of the relationships between people and communities (Liamputtong & Ezzy, 2005). Qualitative research attempts to reveal the processes that underpin the construction and continuation of social

relationships and the meanings that are attached to those relationships (Denzin & Lincoln, 2003; Liamputtong & Ezzy, 2005; Lincoln & Guba, 1985; Silverman, 2005).

Qualitative paradigms assess individual experiences by locating the person within their natural, everyday reality and attempt to understand the relationships between individuals within this reality (Denzin & Lincoln, 2003). Ethnography seeks to understand the world from the point of view of the individual (Liamputtong & Ezzy, 2005). This approach emphasises the cultural influences of perceptions of reality. The interpretation of culture is central to the ethnographic approach. To understand the behaviour of groups of people the ethnographic approach argues that it is vital to understand the shared cultural meanings that provide context to group behaviours (Punch, 2005). To build up a complete picture of individuals' everyday experiences, and how these experiences impact on behaviours, involves studying participants in their natural setting. This also requires the researcher, themselves, to become part of that natural setting (Cresswell, 2003).

Phenomenological research also examines the social environment within which people live. However, its focus is on the individual. It seeks to understand everyday experiences from the individual's perspective, in other words, how individuals' have constructed their perceived reality (Liamputtong & Ezzy, 2005). The phenomenological paradigm argues that there is a certain degree of intentionality in people's actions. To gain an understanding of the reasons behind the actions that people take it is necessary to understand the meanings people assign to these actions (Liamputtong & Ezzy, 2005). Phenomenological research involves engaging with small groups of people for prolonged periods of time in order to appreciate the world

view of that person, and the processes that individuals use to assign meanings to events and situations (Cresswell, 2003)

Grounded theory is a research strategy that is directed towards developing theory from data. As the name suggests the emergent theory is ‘grounded’ in the data (Punch, 2005). Ground theory is characterised by its focus on data collection and analysis. Basically the grounded theory approach argues that theory is built up inductively from data (Strauss & Corbin, 1998). As the aim is to generate theory from data the grounded theory approach is not based on pre-existing theories, it begins with no pre-determined hypotheses and allows theory emergence to be directed by the data (Punch, 2005). By following this process the grounded theory approach argues that theory will resemble the reality from which the data derived (Strauss & Corbin, 1998).

While these paradigms offer a means of better understanding the relationships that exist between individuals, and between individuals and the community, they assume a certain degree of predictability (Denzin & Lincoln, 2003). To adequately assess relationships and perceived realities requires a stable environment and observations made over a prolonged period of time. This renders these qualitative research designs inappropriate for natural hazard research. Natural hazards are inherently unknown events. For individuals living in these areas a high degree of uncertainty exists regarding when and where hazards will strike. The challenge for natural hazard research is to assess peoples understanding of an unknown reality. The reduction of this uncertainty is one of the main reasons for the natural hazard preparation activities undertaken by emergency management and other agencies with responsibility for managing risk and facilitating people’s safety.

The present study is endeavouring to identify those factors that influence individuals' decisions to prepare their households against the consequences of natural hazards. It is attempting to elucidate, for example, the processes that underpin how people evaluate their circumstances and the efficacy of performing a specific act, natural hazard preparation. Participants are being asked about their beliefs about hazards and development of their expectations about natural hazard preparing. In other words, to conjecture about a future situation. This is inconsistent with qualitative paradigms such as grounded theory, which argues against starting with pre-existing theories or models. Rather, grounded theory is based on theory and associated models emerging from the data. The present study requires a qualitative method that can address both the expectations and values that people attach to preparing and also recognise the influence of the social environment. For these reasons Means-End Chain Theory (Gutman, 1982; 1997) was used to analyse data.

4.1.1 Means-End Chain Theory

Simply put, Means-End Chain (Gutman, 1982; 1997) seeks to understand why consequences and values are important to an individual. This approach argues that people are motivated to perform behaviours if it is believed that these behaviours have personal relevance. The relevance attached to a behaviour is the outcome of a process where the individual recognises the relationships between the attributes of the behaviour and desired goals. Knowledge is argued to be hierarchically ranked with concrete and abstract thoughts linked with attributes at the lower levels of cognitive processing and progressing through deeper cognitive levels to values.

Means-End Chain Theory posits that the meanings that people attach to behaviours can be conceptualised in terms of the attributes (physical/concrete associations attached to the behaviour) of the actions, the consequences (functional or psycho-social) of performing the action, and the level of personal satisfaction in fulfilling desired values or goals (Woodside, 2004). In a natural hazard context the decision making process progresses from concrete (supplies of non-perishable food, emergency evacuation plans etc.) and abstract (threat perceptions) attributes to deeper levels of cognitive processing related to the relationship between the individual, the hazard environment and the content of the information available to them. The three levels, attributes, consequences and values, are connected in that the lower levels of abstraction, physical and abstract attributes, are the means by which the higher levels, values (perceptions of safety), are achieved (Mort & Rose, 2004; Woodside, 2004).

Means-End Chain Theory is based on Expectancy Value Theory (Fishbein & Ajzen, 1975). The actions of individuals produce outcomes. Once people understand which of these behaviours produce desired or undesired outcomes their behaviour is adjusted accordingly. This is consistent with the underlying rationale for the Social Predictor Model of Intentions to Prepare (Paton, 2006). That is, progression through the sequences of behaviours depends on people holding positive beliefs regarding the efficacy of protective measures in minimising the consequences of natural hazards.

Fundamental to Means-End Chain theory (Gutman, 1982; 1997) is the role of intentionally (intentions directed at performing a particular action) and the social nature of language. This theory argues that thinking and decision making are inherently social activities, ingrained in the use of both public and private language (Bagozzi & Dabholar, 2000). In other words, Means-End Chain theory contends that

the reasoning process that people engage in when making decisions are expressed through language. The central role accorded to intentions and discussion is consistent with the core concepts of the Social Predictor Model of Intentions to Prepare (Paton, 2006). This renders Means-End Chain theory a suitable platform for assisting people in articulating their beliefs regarding intentions to prepare their households against the consequences of natural hazards.

4.1.2 Interview procedure

Although attainment of values is the end point in a means-end chain the actual connection between attributes and values is not necessarily consciously known by the individual. In order to elicit and articulate this implicit knowledge a laddering technique developed by Reynolds and Gutman (1988) and expanded on by Pieters, Baumgartner and Allen (1995) was used. Laddering refers to an in-depth interviewing technique used to understand how individuals translate attributes to meaningful values (Reynolds & Gutman, 1988). The connections between attributes and values are revealed through a succession of consequences associated with the activity under investigation. The laddering technique reveals the sequence of decision making leading to preparedness decisions.

As discussed previously (Chapter 2) tapping into the oral history of natural hazard events provides a unique insight into current individual and community attitudes to natural hazard preparation. Entering into a discourse with the participants about their decisions to prepare will enable an analysis of those unconscious reasoning processes responsible for the decision making process. Thus, the laddering approach provides a structured framework for eliciting more detailed information

from participants regarding the relationship between people's decision making processes and their surrounding social environment.

Participants were initially asked to identify salient attributes that differentiate alternative choice alternatives. This was accomplished via an interview schedule (see Addendix D). For each response participants were then asked to specify the sequences of the decision making process through a series of repeated 'why' questions (i.e. "why is this attribute important to you?"). For example, the initial question in the schedule was "How would you rate the value of preparing for floods, on a scale from very important down to not important at all?" Once the participant had given their initial answer they were asked a 'why' question. When they had answered this they were asked another 'why' question and so on until the interviewee could no longer answer the 'why' question. Once this point had been reached the next question in the schedule was asked and the process repeated. The following section of an interview from a resident of Invermay demonstrates this process.

> Q. How would you rate the value of preparing for floods, on a scale from very important down to not important at all?
>
> *A. I suppose it depends where you live…in the '29 flood I was on the edge of, just on the edge of it, apparently from what I've heard, so how I'd rate it, well, I suppose in the middle somewhere, 3 I'd say.*
>
> Q. Why would you rate yourself there in the middle or number 3?
>
> *A. Well I suppose…I'm not greatly…it's a good question you ask, uh, I suppose what's going on in England [floods in England at time of interview] at the moment would make more people aware. But, uh, I'm not greatly worried but then again I suppose you could*

> *just say I'm aware and, you know, living in a sort of a prone area*.
>
> Q. Well can I just ask why you're not greatly worried about floods?
>
> *A. There again I suppose when you live to my age you begin to realise that it's not too much worrying about a lot of things.*

From this exchange it can be surmised that while flood issues are important it is not dominant in this participant's thinking, in part due to old age causing an adjustment of priorities. This conclusion was not reached by simply asking for reasons regarding flood preparation. By asking a series of 'why' questions the underlying reasons why flood issues are not a high priority were revealed.

4.2 Method

4.2.1 Participants

Participants were selected via the consent forms that were sent out with the earthquake/flood preparedness questionnaires in the quantitative component of the study. The consent form asked participants if they wished to continue their participation through a telephone interview. If participants agreed they were asked to sign and return the consent form along with the questionnaire. Telephone interviews were conducted, recorded and analysed from April to December 2007. Data was analysed using Nvivo 8.0.

In total, some 45 participants were interviewed, with 15 each from Napier New Zealand, Benalla Victoria and Invermay Tasmania. Assessing participants from both earthquake and flood affected areas and across a diverse range of locations assists in

identifying those hazard cognitions that are commonly used irrespective of hazard or setting. Recognising commonalties in socio-cognitive processes is vital when developing all-hazard mitigation programs. In qualitative research final participant numbers are determined by the quality of the data. The aim is to conduct interviews until common themes reoccur and no new data is unearthed, thus theoretical saturation is achieved (Liamputtong & Ezzy, 2005; Strauss & Corbin, 1998).

4.2.2 Coding

Reynolds and Gutman (1988), when detailing the coding process following the laddering interview technique, suggest that data should be categorised into the levels of Means-End Chain (attributes, consequences and values) and then broken down into its constituent parts. As this is similar to the open and axial coding method used in Ground Theory (Strauss & Corbin, 1998) it was decided to use this technique. A further reason for using this method was in establishing connections with the social environment that participants were referring to when forming their hazard cognitions.

Open and axial coding breaks down data to its smallest possible part to expose the thoughts and meanings that underpin people's decisions. In open coding the text is analysed to the extent that each observation, sentence and paragraph is analysed and assigned a category that presents a particular meaning. In this case constituent parts of each interview were assigned to categories that reflected natural hazard cognitions. Axial coding then takes these constituent parts and reassembles them into new categories and relationships. Data were assigned to codes based on the commonalities with the levels of abstraction for Means-End Chain Theory (Gutman, 1982; 1997), attributes, consequences and values. This is important for Means-End

Chain analysis as it is the relationships between the elements that are the focus, not the elements themselves (Reynolds & Gutman, 1988).

4.2.3 Interpretive rigour of qualitative data

To ensure the validity of the qualitative data Lincoln and Guba's (1985) interpretative criteria was used. Credibility was ensured via the use of triangulation. This refers to the use of converging data sources, multiple perspectives and sources to clarify meanings (Stake, 1998; Janesick, 1998). The most common method is to combine quantitative and qualitative data. This ensures that the findings arising from the data are kept in context (Patton, 2002). A further advantage in using converging data sources is in achieving internal consistency. Triangulation of data sources helps to verify the internal validity of the findings (Teddlie & Tashakkori, 2003; Lincoln & Guba, 1985) by ensuring that findings are consistently being assess in relation to the context (Patton, 2002). Dependability of the data was achieved through the use of an independent assessor. Confirmability was achieved by means of an audit trail. This includes the raw data and using text and matrix searches in Nvivo 8.0.

4.3 Relating the qualitative data to the Social Predictor Model of Intentions to Prepare.

As Figure 7 shows intentions to prepare households against natural hazards are arrived at via progressive stages of behaviour. Individual, community and societal factors interact to influence hazard preparedness decisions. While the quantitative component of the study was able to confirm the influence of these social cognitive variables it was not able to provide specific information relating to what individuals

are actually talking and thinking about in relation to their decision making. For this reason the qualitative data was used further explain the variables of the Social Predictor Model of Intentions to Prepare (Paton, 2006).

4.3.1 Individual factors

The initial stage of the model assesses the expectations that people have that engaging in preparation activities will achieve valued goals. It is the beliefs that people have regarding the outcomes, how the person evaluates those outcomes, either positively or negatively and whether the person believes they can perform the behaviour (Abraham et al., 1998; Bandura, 1998; Lippke & Ziegelmann, 2006). These expectations are initially motivated by people's need to reduce the uncertainty associated with natural hazards. The respondents from all three locations indicated that being able to reduce uncertainty manifested itself as the attaining of peace of mind. A further overriding motivation for preparation was the responsibility that people felt towards helpings others in the community. Table 6 demonstrates residents' attitudes regarding their expectations of preparing.

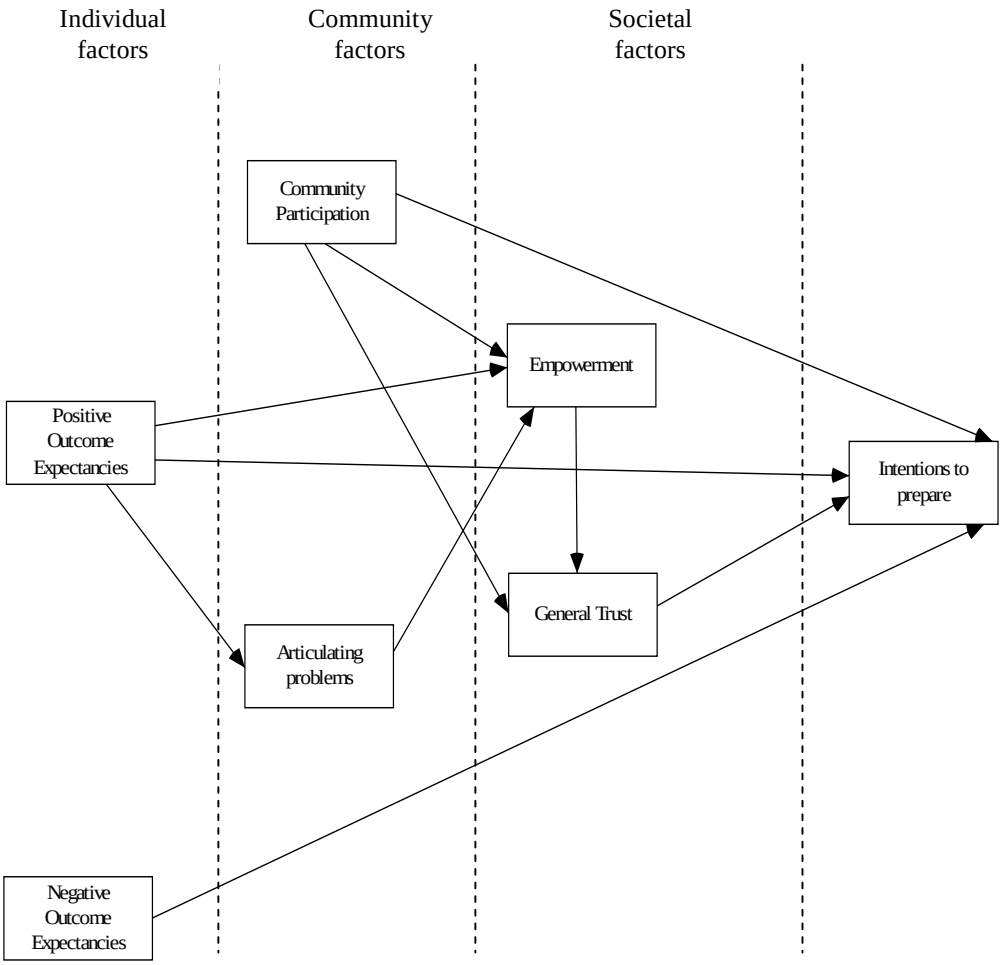

Figure 7. Social predictor of intentions to prepare for natural hazards (Paton, 2006).

Responsibility to others. An overriding motivational factor for all respondents in initiating preparation activities was having the ability to render assistance to others in the community. This was an unexpected finding and has potentially important implications for conceptualising community relationships in regards to preparing for natural hazards (and will be discussed in greater detail in Chapter 6).

This sense of having a responsibility to help others was a common factor in all three locations and perceived as a major benefit in being prepared. As Table 6 shows

this concern for the welfare of community members ranged from having the belief that assistance could be rendered in the aftermath of an earthquake to ensuring that new arrivals to flood affected areas had access to local knowledge of flood events.

This suggests that when people are forming intentions to perform hazard preparedness activities a moral component (social responsibility) is considered. Godin, Conner, and Sheeran (2005) have argued that intentions to perform particular actions are more likely if people feel an obligation to perform an action (i.e. feel a responsibility to help others in the aftermath of an earthquake). According to Godin et al. if certain behaviours are perceived to have moral implications (e.g. giving blood) or are associated with moral values (e.g. smoking near pregnant women) then they are more likely to form intentions to perform that behaviour.

Peace of mind. Interviewees in all three locations indicated that a major expectation they attached to hazard preparation was attaining peace of mind. This is important as earthquakes, floods and other natural hazard events are unpredictable in the extreme, creating a complex climate of uncertainty. Having peace of mind can assist in reducing this uncertainty and the psychological stress associated with a natural hazard event (Sumer et al., 2005). As demonstrated by Table 6 interviewees indicated that being prepared would assist in giving them a sense of security, safety and help in allaying the fears associated with the consequences of natural hazard events. That is, people could be conscious of a positive relationship between preparation and increased safety.

Table 6.

Participant Quotes Relating to Individual Factors (Peace of Mind & Responsibility to Others) of the Social Predictor Model of Intentions to Prepare (Paton, 2006)

	Individual factors	
	Peace of mind	**Responsibility to others**
Napier	At least knowing that you're prepared for the family and educated your mates as much as you can, it's half your battle (James). Well I suppose just to know you had done all that you could to prepare and anything that happened beyond that, beyond the preparation that you could humanly make, that you wouldn't have to berate yourself for not being prepared (Claire).	But if I can help someone, even if it's not us, I feel that it's important to adopt a, it's a responsible attitude really isn't it? Because it's a bond, not cark it because you don't have enough food in the house or something like that which you could have bought (Heather). But if there was a quake I'd make it my business to find out if everyone is alright, and especially, you know, my friends…and then I'd check on my, my daughters, they don't live in Napier but, you know, I'd make it my business to check them out (Bruce).
Benalla	Oh yeah, look it is beneficial I think to…allay the fears, there are so many people who are very fearful (Darryl). I haven't been in a flood before but from what I've seen and, and heard those that prepare have a lot less, less stress on them afterwards because their better prepared (Julia).	So in this way if we all interact with one another and we help one another we all going to be a damn sight better off (Simon). From my point of view is if it ever comes up about floods and flood preparedness…I could say "well this is what I've done and how I know I can cope" and maybe tell others how they can cope as well (Darryl).
Invermay	I think if you organise things like this is just one less thing you've got to worry about (Philip). It's been an interesting journey for me just so far, sort of, not being oblivious to it then finding about the situation and then being worried and then working through that and becoming quite at ease with the situation and then every now and again having a little "oh that's right, you know, maybe long term it's not a good place to stay and", so anyway the journey continues. (Jenny)	I'm a ratbag, by taking a ratbag position it'll actually make people actually think more about their own position. Sometimes what I get is automatic reactions from people who haven't thought anything about it so, sometimes by taking a ratbag position you can actually help people to feel more firm or have a look at their own views. So a bit of consciousness raising is not a bad idea (Wayne). Also from a, a community point of view, family and friends and SES, so the less demands you put on the infrastructure the more assistance there is for those people who, for whatever reason, don't do anything (Philip).

The expectations that people have regarding protective measures is gaining peace of mind. This shows that people are motivated to reduce uncertainty. What these expectations highlight is that through preparing individuals achieve peace of mind. This is important as having peace of mind can assist in reducing psychological distress following a major natural hazard (Sumer et al., 2005). Sumer et al. found that following the major 1999 earthquake in Turkey people that reported higher levels of optimism and self esteem were less likely to suffer stress as a result of experiencing the consequences of an earthquake.

While having positive expectations is important in the initial motivation stages of preparing, it does not guarantee that people will know what to do. As was shown in the previous chapter the social environment within which individuals operate plays an important role in the preparedness process. That is, peoples understanding of hazards and the actions necessary to mitigate the effects are influenced by their interactions with others in the community. The next section looks the factors within the social environment that influences people's natural hazard preparedness decisions.

4.3.2 Community factors

In conditions of uncertainty people will initiate an information gathering process to assuage this uncertainty (DeCremer & Sedikides, 2005). The Social Predictor Model of Intentions to Prepare (Paton, 2006) argues that people will firstly seek out others that hold similar values to them. In times of threat people will make use of both formal and informal information sources (Briggs & Stern, 2007). The

model argues that people will avail themselves of collective knowledge in order to fulfil their particular needs, thus helping to reduce uncertainty.

If, however, community knowledge is not sufficient enough to address the specific needs of the individual then civic emergency management authorities will be approached. In other words, the community factors of the model are assessing individuals' perceptions regarding personal empowerment. Table 7 provides a selection of quotes that demonstrate the reasons underpinning participant's involvement in the community. It highlights that community involvement is general and not specifically directed towards natural hazard preparation and can be dependent on the salience that people attach to hazard preparation the extent that people perceive that members of these community groups share similar experiences to them.

Community involvement. Table 7 illustrates that participating in community activities played an important part in participants day to day to life. The fact that general involvement in community level activities (e.g., neighbourhood watch groups, local church groups, Lions etc.) was implicated repeatedly as a factor in how people arrived at their preparedness decisions highlights how mainstream community competencies and characteristics can influence the development of people's capacity to adapt to hazard consequences. The fact that a level of disaster resilience can reflect the influence of pre-existing community characteristics and competencies supports the view that risk management strategies can be developed and implemented by integrating them with mainstream community development activities (Paton et al., 2009). This issue will be discussed more fully in Chapter 6.

Recognition of the role of mainstream social processes in preparedness decision making raises the question of how social networks can be motivated and mobilized to facilitate sustained preparedness, particularly when it is considered that education programs are delivered during times when nothing is happening. A need to consider the latter issue is rendered particularly important by the relationship that people draw between natural hazards and salience.

When pressed to articulate whether they would participate in community activities focussed on hazard preparation participants indicated that other issues took priority. As Table 7 demonstrates, (salience column) this includes family commitments and other general community activities. Participants indicated that consideration of involvement in community activates directed at hazard mitigation would only stem from a direct approach from a relevant source. As an example one of the Benalla respondents in Table 7 (Julia) indicated that receiving the flood questionnaire caused her to think about becoming involved in flood activities. However, this only encompassed filling in and sending the survey.

What this indicates is that the concern regarding natural hazards, while important, is not all consuming. This could be reflective of the fact that these communities have not had recent experience of a major natural hazard event (i.e. the last major earthquake in Napier was in 1931, the last major flood in Invermay was 1929). The connection between salience and preparedness has been demonstrated in various natural hazard settings. In assessing the degree of salience in areas at risk of volcanic activity Davis et al. (2005) have reported that those areas that had recent experience of volcanic events reported increased levels of thinking about issues of

volcanic preparation compared to those areas that had experienced little activity. Pfister (2002), reporting on the aftermath of a flood event in a rural community, suggested that flood levees (constructed prior to the flood event) may have contributed to residents' lack of preparation. Since the construction of the levees residents have not had direct experience of floods. According to Pfister this could have resulted in flood issues losing their salience over time, resulting in people being less prepared to act.

Table 7.

Participant Quotes Relating to Community Factors (Community Involvement, Salience & Shared Experiences) of the Social Predictor Model of Intentions to Prepare (Paton, 2006)

	Community factors		
	Community involvement	**Salience**	**Shared experiences**
Napier	Neighbourhood watch over here is quite a big thing, but it's mainly against crime, you know, we keep an eye on whose in the street and cars, strange cars and that sort of thing (Bruce). Well I think I'm a part of the community and I'm doing something, but that's only my own personal view …I reckon I could rely on my own neighbourhood support group really (Mary)	Busy lives, parents working, kids go to school. They're so busy just looking for material things in life and surviving that they don't actually take an interest in what's going on around them (Heather). I just think people are so insular, they just sort of concerned with their own little lives and don't think about, well not necessarily anybody else, but they don't think about what might happen tomorrow (Tanya).	*Lack of significant earthquake experience precluded any response on this issue in Napier*
Benalla	Well…otherwise the world just goes past if you don't take an interest, you know, and you need community discussions (Roger). There's the neighbourhood, neighbourhood watch is pretty active…um…there's a lot of like there's, a lot of my friends are involved in things, you know, they'll always say things like "I had to do meals on wheels", there's a food bank that's just started up, you know, Red Cross are quite active, the SES are very active around here, where I live (Julia).	But things like filling out the survey…I filled it out almost on the same day and sent it back as a priority…a way to become involved in something without having to put too much time, effort and energy in to it, but wanting to help (Julia). if someone asked me to do something I'd likely do it but I'm involved in kids, sports and committees and work…you don't go looking for extra things because I'm studying so I don't have a lot of time, time is really the answer (Karen).	Yeah, well the neighbours around me, they haven't been through it. It's pretty new homes here, one neighbour comes out from a farm…and another one's, she's never been through it. No, well a lot of them haven't…been through a flood, but not in my area (Joan). Well, we don't belong to any particular, we not joiners and we just, and the neighbours, well we're quite friendly with them but we don't talk about flood particularly (Helen).
Invermay	I'd like to think that I'm pretty aware of what's going on in the community. I do my best around the school, parent help and things like that (Cara). The more community minded people are the more friendly they are, the safer you feel, the more you feel that it's safer for your children. So I think it's just being a part of the community really (Philip).	Probably with my situation at the moment I only take on just as much as I can handle at the moment…I'd like to think that I'm pretty aware of what's going on in the community (Cara). What's on the news at the moment, things like the pulp mill at the moment I guess, it's just sort of taken the limelight. So it's on the backburner I guess (Paul).	I suppose the main thing is, because I've lived and had an association with this place, you know, like 1956 (Martin). When you live in an area you live there for a number of reasons. One is work, but importantly because you want to be there and part of that wanting to be there is your environment which includes…what the people are like around you (Philip).

Shared experiences. One of the objectives of the qualitative analysis was to provide a further examination of all-hazards aspects of hazard preparedness decision making. While many issues were common across communities and hazards, this was not the case for shared experience. This was due to lack of experience of significant damaging earthquakes in Napier. While floods do not occur annually, the flood data was obtained from communities that had experienced significant events.

For Benalla and Invermay interviewees community involvement depended to some extent on perceptions of shared experiences. Shared experiences provide a reference point from which people can construct meaning. In order to make sense of the information that is needed to be able to live within a community the information needs to be filtered through the community's shared values (Silberbauer, 2003).

The relationships that constitute a community help to give people a sense of identity and security (Fullilove, 1996; Prewitt Diaz & Dayal, 2008). The Invermay data presented in Table 7 demonstrates that the attachment respondents felt towards the suburb of Invermay was based on the physical location. However, the sense of place that people feel towards a community includes not only a physical attachment but a psychological one as well (Prewitt Diaz & Dayal, 2008). A community is not only a place for physical shelter, continue Prewitt Diaz and Dayal, it also includes peoples past experiences, memories and shared meanings. For instances, in Table 7 one of the Invermay interviewees, Phillip, is also talking about the importance of the relationships he has with other Invermay residents. Another of the interviewees in Table 7, Martin, talked about his association with Invermay for over 50 years. He also went on to discuss the importance he attached to passing on the flood history of

Invermay to new residents. In total five of the 15 Invermay residents interviewed talked of the importance a shared community level approach to significant issues.

As was discussed in Chapter 2 a disruptive event such as a natural disaster can sever these social bonds, endangering individuals' mental health. As Fullilove (1996) has argued, one of the important components in quickly returning to normal following a hazardous event is the reconstitution of these social bonds. Both the positive and negative effects of reconstituting social relationships were demonstrated by Benalla residents when relating their views on community involvement with reference to the major flood event of 1993. While the aim is to return to normal life the devastating effects of a natural hazard means that the social bonds will be an approximation of the pre-flood state, not an exact replica (Sullivan, 2003).

According to Maguire and Hagan (2007) this can have positive effects for the community. Rather than returning to a pre-event state the experiences and lessons garnered from the event can be incorporated into the social structures resulting in a more resilient community. The following quote from a resident of Benalla demonstrates that as a consequence of their previous flood experiences individuals in the community have taken it upon themselves to alert others to the risks associated with floods and earthquakes and to highlight the benefits of preparing.

> *"…it's about educating new people who come in [to Benalla] because once your experienced you already have a reasonable level of knowledge but for people that haven't been through it they're got to understand…the sort of things that impact upon you…we're in an area of the town because of our level we don't have a sewage system, we use our septics as tanks etc., and of course what happens when the*

> *water comes through and floods? All your sewage comes out and flows into the rivers…people have got to be aware how toxic some of this water is that's flowing through the place" (Kevin – Benalla).*

However, the experiences of natural hazards such as floods can also have a negative effect on subsequent interactions with the community. A number of Benalla residents (4 of 15) viewed their experiences in the 1993 flood as a barrier to them participating in community flood activities. These residents indicted that it would be pointless in engage in conversation as other community members, particularly residents who had settled in Benalla after the 1993 flood, had no previous flood experience. These residents believed that their unique flood experiences would not be understood by other community members. One of the Benalla residents indicated that her belief that the flood she experienced in a separate location was more severe than that of the 1993 flood. A further impediment to engaging with the community was that of a perceived lack of neighbourhood relationships, resulting in a sense of not being part of the community. One of the respondents talked about the neighbours who had experienced the 1993 flood had either left Benalla or had died. This contributed to this resident's feelings of community isolation.

The flood experiences of these people may have resulted in them having a narrowly defined criterion of group membership resulting in them excluding those who have had no flood experience. This was demonstrated by the previously mentioned residents, and their belief that they would not be able to fit in with community groups due to this perceived lack of common experiences. According to

Gordon (2004) the flood experiences of these people has become a defining factor in their reconstructed social systems. As the social system is defined purely by each individual's experience of floods it gives a misplaced sense of homogeneity (Murphy, 2007). People may now judge others both within and outside of the group according to the narrowly defined criteria of membership (Fullilove, 1996).

Articulating problems. It was evident from the analyses of the flood and earthquake models (see Figures 2 and 3, Chapter 3) that people could not articulate exactly what it was they needed from civic emergency management agencies. This finding was repeated in the interview data. As the quotes in Table 8 illustrate residents of all three locations reported a degree of uncertainty regarding how to effectively prepare. The quotes further show this uncertainty stemmed in large part from a perceived lack of information. This can impact on people's preparedness levels. Lacking the specific knowledge regarding natural hazard issues can restrict meaningful dialogue between communities and civic emergency management agencies.

The uncertainty generated by natural hazard events necessitates access to specialised information that is not normally required by members of the general public in the course of their day to day life. To access this information people will need to interact with relevant emergency management agencies. This requires community members being able to articulate to the relevant authorities their specific needs, and being confident that the answers they receive from these authorities will assist in reducing their uncertainty. It is this interpretive process that forms the basis of perceptions of trust in emergency management authorities. If people could not

articulate what they required from civic emergency management agencies to meet their needs they were less likely to form intentions to prepare. This has implications for understanding comments regarding people's view that they lack information. For example, information may be there, but if people can't formulate appropriate questions, they may be unable to make sense of what is there or be able to ask more specific questions of expert sources (Paton, 2008).

4.3.3 Societal factors

Societal factors provide an indication of the type and quality of the relationships that exist between authorities and the community. One important aspect of hazard mitigation is for civic emergency management agencies to make use of the existing problem solving skills that are available within the community. By utilising a community's capacity to withstand the consequences of natural hazards (and enhancing it through the provisions of specific information and necessary resources) civic emergency management agencies can increase a community's resilience in the face of a natural hazard event (Murphy, 2007). Gaining an understanding of the resilience of a community can be assessed by the extent to which people believe that emergency management authorities will assist them in their preparedness decisions, and the extent to which emergency management authorities are utilising and improving existing community capacities. The Social Predictor Model of Intentions to Prepare (Paton, 2006) accounts for these relationships by assessing whether people believe they are operating in an empowering setting through measuring empowerment and trust.

Empowerment. A fundamental component of empowerment is that it allows people to gain control over their activities in order to effect change (Dalton et al., 2001; Fitzsimmons & Fuller, 2002; Peterson & Hughey, 2004; Rappaport, 1987). This is particularly important for people dealing with infrequently occurring natural hazards. Having the ability to exercise control can assist in reducing the uncertainty and apprehension associated with these events. It was this uncertainty that was a major influence in the interviewees in flood affected areas exhibiting almost no sense of control over hazard preparation activities (see Table 8). Respondents from these areas indicated that their uncertainty was based on a perceived lack of relevant information being provided from civic emergency management authorities.

Table 8.

Participant Quotes Relating to Societal Factors (Uncertainty & Individual Responsibility) of the Social Predictor Model of Intentions to Prepare (Paton, 2006)

	Uncertainty	Individual responsibility
Napier	We haven't, I don't know how you would actually go about restraining larger items like pieces of furniture and stuff (Joanne). I don't know what you'd do to prepare for them; I don't know how you would do that quite frankly…but if that happened today well God only knows how we would react (Bruce).	I take responsibilities rather seriously um, um, I hate to see people hurt in any way, shape or form, that's just me I'm afraid, it's just the way I am I'm afraid (Bruce). Yes, that's the problem, if things go wrong they automatically look to the agencies, if the agencies aren't prepared they will blame them rather than themselves for their own lack of preparation (Michael).
Benalla	I don't feel very well informed at all. I've never seen a lot of public information about flooding, there's not been a lot of it and in the recent floods in Victoria here they didn't even give public warnings, they forgot about that" (Amanda). So I guess I wouldn't know how to cope within a flood, that was flooded then, I mean (Karen).	Totally important that everyone, in my opinion, should get involved and have an opinion (Roger). You've got to get on with your life but I think that there's definitely an area that people have to realise that they can impact on their own preparedness by the way that they develop their properties, and what I was saying earlier about fencing and trees and all those items will artificially raise the level and where you might think "oh well, it's not going to hurt", well 6 inches might mean that it goes under the floor rather than comes through the house (Kevin).
Invermay	I need to ask these kinds of questions, where do you get sandbags from, all sorts of things, yeah, I'm pretty ignorant though (Cara). Well I don't know, I really don't know and I suppose depend so greatly on the extent of the flood like how much water, you know, how much water was involved, the state of the levees, just how prepared they are, I don't know, really don't know. (Jenny)	

The perceived paucity of relevant hazard information may reflect shortcomings on the part of civic emergency management authorities. However, as was discussed in the above section on articulating problems, it may reflect community member's inability to specific exactly what they need to reduce their uncertainty. An associated point is whether people, once they have found relevant information, know how to adequately use this information. The interview data from Napier provided a demonstration of this. When questioned about their level of preparation activities six of the interviewees indicated that knowledge of the natural hazard information contained in the yellow pages of the telephone book was an important component of preparing. These respondents believed they had some control over their preparation as they believed this information to be relevant to their needs. A Napier interviewee explains what type of information the yellow pages contained.

> *"It's in the phone book, if you open up, and I've got it right here, you open up the phone book, basically right here inside the back page there's a rather large page that says get ready to get through you could be on your own for three days. It talks about earthquakes and storms and all that sort of things" (Michael – Napier).*

The problem with this information search is that people could be confusing knowledge of where relevant information is located with actual knowledge or knowledge of how to actually apply this information in the event of an emergency. Particularly when dealing with hazards such as earthquakes which occur without warning, conflation of knowledge of source with actual knowledge can increase risk.

In a study of preparedness for volcanic activity in the Auckland area Paton (2006) found that while a majority of participants could indicate that hazard preparation information was contained in the telephone book, very few could list specific activities that needed to be done in the event of an eruption. This is further indication that simply providing hazard mitigation information is not enough to ensure the adoption of protective measures. That is, if people conflate their knowledge of source with actual preparedness, they are likely to overestimate the latter (Paton et al., 2008). Anderson-Berry (2003) has suggested that prior to hazard information being internalised it needs to have meaning. An illustration of this is provided by one of the Napier interviewees when discussing the effectiveness of the information contained within the telephone book.

> *"You can look up the yellow pages at the back of the phonebook, but that's national that's not local, you know" (Tanya – Napier).*

One potential problem with people perceiving that they are not in control of their preparing is in apportioning blame. People who do not feel that they have control over a potentially threatening situation may look to simplistic causes to explain what is happening. In order to interpret an unusual or unexpected event people will seek meaningful explanation. Often this can take to form of blaming an individual or an organisation (Kumagai et al., 2004).

When investigating the influences of the causal attributions that individual can make following experiences of bushfires Kumagai et al. (2004) noted that in the

absence of no other contradictory evidence people who had suffered fire damage to their property attributed the cause to back burning undertaken by fire-fighters. In contrast Kumagai et al. found that people who had firsthand experience of the causes of fires and their consequences (had seen fire-fighters in action, had witnessed lightening strikes) were more likely to attribute cause to nature. In this instance people who had more complex causal models of bushfire causes (i.e. were able to take into account multiple sources of information) could appreciate the effort of the fire-fighters, thus engendering trust in emergency management authorities.

By encouraging people to consider a wide range of mediating factors regarding hazard preparation (i.e. what the actual consequences of a natural hazard will be) prior to making decisions can increase the likelihood of people initiating hazard preparedness (Whitney et al., 2004). This is linked to the salience of the issue. Whitney et al. have argued that if hazard issues are current, that people are thinking and talking about hazard issues, this can influence attitudes to hazard preparation.

The respondents who did indicate that they perceived themselves to be in control of their preparation activities were those who were not totally reliant on authorities for direction in preparing. The absence of authorities puts the onus on individuals to become part of the process. As people perceive a situation growing in uncertainty (i.e. a natural hazard event) the need for an empowering setting also increases as people are motivated to reduce the prevailing uncertainty (Bandura, 1997; Fitzsimons & Fuller, 2002). An example of this was provided by a Napier interviewee, Heather. The community that Heather lives in is situated just out of Napier and have organised themselves into an informal support network in the event

of a natural hazard event. Each person in the community is aware of each other's capabilities. For instances a nurse lives not far from Heather so the group has basic medical assistance. Heather's husband works at the local cannery so they have a large collection of tinned goods. The community as also appointed a co-ordinator to manage each individual's activities.

> *"And we have a very good neighbourhood support type thing up and running. So if there was a disaster of any kind then we would all rally together and we all have different capabilities so we could help each other. A real community support type" (Heather – Napier).*

Individuals taking on responsibility for their own preparation were something also alluded to by residents of Benalla with 8 of the 15 respondents interviewed believing it was the responsibility of the individual to become involved in community activities and to make use of available resources.

> *"Well I believe that anybody's got a responsibility to the community that they live in. That to me is part and parcel of life. You get your living within the community; you get your social interaction within the community. So I believe you owe the community something to pay it back" (Simon – Benalla).*

These examples highlight an important aspect of the empowerment process, individual responsibility. For empowerment to be effective members of the community need to be in a position to assume more responsibility for natural hazard preparing (Fitzsimons & Fuller, 2002; Karanci et al., 2005; Murphy & Gardoni,

2006). However, it is important to point out that even if people are empowered it still needs an empowering environment for people to exercise control over their activities. In assessing government and community responses to natural hazards in India Metri (2006) suggests that even if community members are meaningfully involved in preparation activities they still need specialised assistance (i.e. education, training, specialised resources) from the authorities to be fully empowered.

One of the reasons the Social Predictor Model of Intentions to Prepare (Paton, 2006) was selected for the present study was its ability to differentiate between empowered people (community participation, articulating problems) and empowering settings (empowerment, trust). The qualitative data presented here indicates varying levels of uncertainty associated with natural hazard preparing. In turn, this suggests varying levels of perception regarding people's belief they are operating in an empowering setting.

The degree to which Napier interviewees indicated they were in control of their preparation activities illustrates the contextual nature of empowerment. A person may feel empowered in one setting but is not empowered in another (Dalton et al., 2001). Empowerment can mean different things to different people and to the same people in different situations. Combined with the unique characteristics of natural hazards such as earthquakes and floods, and the unique situations they present to affected communities, aspects of hazard mitigation strategies need to be couched in language that mirrors particular societies and contexts. (Drottz-Sjöberg, 2000).

As discussed in Chapter 2 this is reflective of perceptions of hazards arising from an individual's cultural worldview (Rippl, 2002). This highlights the need for an

interactive relationship between civic emergency management agencies and communities to identify specific needs. How people assess the quality of this relationship forms the basis of the next section with a discussion on the qualitative findings relating to trust in civic emergency management authorities.

4.3.4 Trust

In pre-natural hazard periods the information sources that people utilise to negotiate day to day life can be informal (community members, community groups) and formal (relevant authorities). When faced with a natural hazard event people will become reliant on authorities (i.e. civic emergency management agencies) for the provision of information and resources that are beyond their normal everyday experience (Murphy, 2007). Given the uncertainty and infrequency associated with natural hazard events a relationship between communities and civic emergency management agencies that is based on trust is crucial for people to make preparedness decisions when not in possession of all the facts (Poortinga & Pidgeon, 2005). This is important because when people trust other agencies (i.e. other people, institutions) they are expecting these other agencies to act in a manner that is beneficial to them. If people trust an information source it can make the decision making process easier by reducing the uncertainty that can be involved in these issues (Siegrist & Cvetkovich, 2000).

An important finding arising from the data was the distinction that people made between trust and distrust in authority. These two distinct entities of trust and distrust arose from people's engagement with authorities and their assessment of the

relevance of the information provided by these authorities. People need to believe that the information provided by emergency management services is meaningful, that it addresses specific concerns they have in relation to the effects of natural hazards (Frewer, Scholderer, & Bredahl, 2003; Lion et al., 2002). That is, it must be relevant.

The qualitative data showed that individuals differentiate hazard preparedness information based on their perceptions of the meaningfulness of that information. The findings showed that information considered to be relevant influenced perceptions of trust, while information that was deemed to be irrelevant influenced perceptions of distrust. Tables 9 and 10 present participant quotes that illustrate the relevance/trust and distrust/ relevance relationships.

Table 9.

Participant Quotes Relating to Institutional Factors (Trust & Relevance) of Social Predictor Model of Intentions to Prepare (Paton, 2006)

	Trust in authorities	
	Trust	**Relevance**
Napier	I believe so, yes. I do believe they [Napier City Council] do the best they can (Michael). Yes I'd definitely read it [information from Napier City Council] and yeah I think I'd take it on board (Claire).	Well from the government, they wouldn't be doing it for no reason I thought. The ads were good, I mean they were very graphic (Heather). Well because they are actually local, as opposed to something that comes from the government. So I assume that advice from the council would come with some kind of awareness of local circumstances, like tsunami dangers and things like that. And also the council is in a position to provide you with information like that, council newsletters and rates kind of things that you can actually read (Claire).
Benalla	Oh I think the council's done their best, you know, I don't think there's anything more they can do (Helen). Well I know the people, oh well some of the people, who are involved in the setting up of this [early warning] system and I'm confident they've got it right. They've done some trial runs associated with…implementing or trying out what, well this warning system and I'm confident (Darryl).	There was a lot of information that from them [Benalla City Council] after the event which was really crucial to us, particularly for building codes and where they've got these 5 star and 6 star rating house and they've got insulation in the walls (Kevin). Well they probably learnt from their mistakes, perhaps there wasn't enough information before [the 1993 flood] so hopefully they did some, you know, follow up of what might be needed in the future (Julia).
Invermay	If the flood protection was an issue for us, you know, say nothing happens for some time and we would have no hesitation in contacting the council to find out what's happening and hurrying them along (Josh). …and so that's interesting for me going "well I wonder who I should believe" and then just at the end of the day going with my gut feeling that…it's not a place I'd probably want to stay long term but in the short term it's fantastic and fingers crossed, you know (Jenny).	Well I suppose they're [the SES] the ones that have dealings with flooding; they've most probably got the information there (Carol). Yeah I do think there, um, community meetings and the council keeping the people informed and up to date with the latest sort of situation with the levees is really important and I would try to, you know, get to those things (Jenny).

Table 10.
Participant Quotes Relating to Institutional Factors (Distrust & Relevance) of Social Predictor Model of Intentions to Prepare (Paton, 2006)

	Distrust in authorities	
	Distrust	**Relevance**
Napier	I think from the city council, and they would just copy it from somewhere else, it wouldn't be their idea I don't think (Robert). No, but one thing I was really peeved about was when that tsunami warning came over there was nothing about it, nothing done about it actually locally…the civil defence or the council or anything, and there was nothing out on the radio, because I lay there awake worrying, nothing put on the radio to say that there wasn't going to be one or anything. I was all sort of, almost packed up ready to go and there was absolutely nothing done (Tanya).	I don't reckon they do enough. They don't do enough to encourage people to want to know about them. That's the council as well. They're always fighting amongst themselves. If you go to one of their meetings they're having a big squabble…I don't think they're interested in public needs, community needs (Mary). Well all they [Napier City Council] seem to be interested in is putting up great big buildings and building parks and things with their names on them and not getting on with what they should be doing, which is protecting the neighbours around (Tanya).
Benalla	Well my perceptions probably come from my professional life rather than my private life. And my professional life is that the flood authorities really haven't got themselves organised at all (Amanda). Benalla managed the '93 floods disgracefully. Nobody had any warning in the lower lying areas of the town (Chris).	I know from the Gippsland floods they spent a lot of time driving around in boats rescuing people but didn't issue public warnings…even when it was obvious that the floods were travelling downstream and were going to hit Macedon, children could have been at playing and things like that when the flood came through (Amanda). I think they've put a few steps in place with measuring stations, you know, measuring water levels out the road. But, you know, whether their confidently maintaining, working and tested who knows (Chris).
Invermay	Well we've just had a council election, it looks like the council elections have turned into popularity polls, you know (Greg). Well actually my neighbour works for the local council and we were having a chat about it the other day and it was quite interesting what he had to say about it…the levees that they've put up previously were put up by the federal government and then it changed to state government and…it was given to the council and basically it was in disrepair when they got it so nothing's been done, so if a flood does come along it's not going to be worth a brass razoo (Paul).	I don't really think council care too much about it. It's been going on and on, new mayor in there, he says "yes we'll do this we'll do that", they're in there for 3 year terms and then they're out so the portfolio is handed to someone else and they're not really up to it I don't think (Greg). I'm interested in, to see exactly how fast and how far the council will go with the levees and just how good they're going to be, whether they'll be 50% effective or whether they'll be 100% effective. At this stage it's just a lot of talk isn't it? (Ian).

The distinction that people made between trust and distrust in civic emergency authorities represents an important addition to the natural hazard literature. Previous natural hazard work has identified the mediating role of trust between communities and civic emergency management authorities in relation to biological hazards (e.g. Briggs & Stern, 2007), bushfire affected areas (e.g. Vogt et al., 2005), volcanic affected areas (e.g. Paton, 2006) and areas at risk of tsunamis (e.g. Paton et al., 2009). However, these studies were not able to find a discrete influence for distrust. Briggs and Stern did discuss distrust in relation to community members perceiving a lack of information but in terms of distrust resulting from an erosion of trust. In other words, distrust and trust representing opposite ends of a continuum.

Schul, Mayo and Burnstein (2004) have suggested trust and distrust could be representative of separate reasoning processes. If people trust the source of the information they will attend to the information provided. However, if people distrust the information source they discount the information and consider alternatives such as the past history, and their previous experience of the information source. Schul et al. argue that by processing information according to context (i.e. trusting or distrusting environment) people are protecting themselves from being deceived. This implies that it is not the actual information itself that people focus on, but the type of relationship that exists between them and the source of the information. This is consistent with the Social Predictor Model of Intentions to Prepare (Paton, 2006) which identifies the key role of the interactive relationship between communities and civic emergency managers as a means of assessing the resilience of community members to the consequences of natural hazards.

The suggestion of Schul et al. (2004) that people operating in a climate of perceived distrust could be disregarding information and focusing on the procedures of the information source itself was demonstrated in the interview data for Benalla and Invermay. Interview data showed that if individuals perceived that representatives of emergency management authorities were unapproachable and unreceptive to suggestions then a sense of distrust could develop. The following quote from a resident of Benalla illustrates the frustration experienced by some participants.

> *"Oh, well I think they've got set ideas and they quote figures that someone like me would have no hope of arguing against but, it only confuses me to be honest and um…well I'd have no hope in winning an argument against them, those people… Well their just quoting figures to suit their own argument I think" (Richard – Benalla).*

If people do not believe that authorities are receptive to their ideas (i.e. are not operating in an empowering setting) concerning flood mitigation then this can generate feelings of non-inclusion, that they are not part of the process (De Cremer & Blader, 2006). De Cremer and Sedikides (2005) have found that individuals who were denied a role in the decision making process have a high level of uncertainty regarding themselves and their situation, resulting in them being disinclined to co-operate, thus leaving them distrustful of the authority. When this situation is changed, when people have a voice in the process temporary feelings of self worth are generated. When people are uncertain, continue De Cremer and Sedikides (2005), they become more attentive to the procedures of the particular institution. If people

believe that the process is fair, and that they have been treated fairly and with respect people are more likely to trust the group (De Cremer & Blader; De Cremer et al., 2005; Tyler & Blader, 2003).

The key point here is that when people receive hazard information its relevance is assessed with reference to the context within which the information will be used (Kumagai et al., 2004; Lion et al., 2002). Even if, objectively, the information provided by the authorities is correct it may still be rejected by the public because it is not addressing individual concerns. The goal is to find out what people need to know rather than duplicating what they already know (Bostrom, Fischhoff, & Morgan, 1992; Hurnen & McClure, 1997). If specific concerns are not addressed then people will be less likely to attend to information issued by authorities and develop a sense of distrust in them, and in some instances reducing their preparation activities. It is within this context that people will then assess the negative or positive consequences of adopting hazard mitigation strategies (Lion et al., 2002).

4.4 Summary

The findings of the qualitative study provide further evidence of the influence of the social context on the formation of intentions to prepare for natural hazards. The qualitative data provides a more detailed analysis of those everyday life experiences that contextualise hazard preparing issues. This was highlighted by the identification of salience underpinning beliefs regarding community involvement. This was further reinforced with the unexpected finding that a responsibility to welfare others was a motivating factor for natural hazard preparation. This implies that hazard outreach programs need to be considered in the context of peoples other life demands.

The finding that the relevance that people assign to hazard information influences decisions of trust or distrust of civic emergency agencies as important implications. In providing hazard mitigation information emergency management agencies need to ensure that such information is attending to the specific needs and requirements of the community. What this finding also indicates is that agencies need to understand that it is the manner in which the community perceives information that can determine its relevance. That is, the hazard information may be correct in the minds of framers of this information but might not address what the public believes that they need. What is being argued is that trust and distrust may be separate constructs, reflective of separate reasoning process. If this is the case it has important ramifications for the delivery of hazard mitigation strategies. It suggests that separate information strategies are needed to firstly reduce the likelihood of people distrusting authorities and secondly to provide the necessary information.

Linking qualitative data with the Social Predictor Model of Intentions to Prepare (Paton, 2006) has provided important directions for future uses (i.e. inclusion of salience and distrust variables) of the model. However, the analysis was tied to a theoretical model. While the findings of this model have provided valuable insights into the processes through which people link general everyday experiences with hazard preparation what is now needed is a more detailed examination of the beliefs that people have regarding hazard preparedness and the relationships between these beliefs and how they interact to influence hazard preparedness decisions.

The next chapter will extend the qualitative analysis to further explore whether individual accounts of hazard preparedness are consistent with the variables of the model. The qualitative analysis will be further developed through the construction of

cognitive hierarchical reasoning maps that represent people's decision making process in relation to natural hazard issues.

Chapter Five

As detailed in the previous chapter Means-End Chain theory (Gutman, 1982) provided the theoretical framework for the further examination of community and societal influences on intentions to prepare the self and the household against the consequences of natural hazard events. Individual accounts regarding the influences and processes that underpinned hazard reasoning were matched with the variables of the Social Predictor Model of Intentions to Prepare (Paton, 2006) to assess consistency. The qualitative component was able to extent the findings of the model by providing important information regarding the context within which hazard preparedness decisions are made.

For instances, while the Social Predictor Model Of Intentions to Prepare (Paton, 2006) was able to confirm the motivating role of outcome expectancies the qualitative data expanded on this with the unexpected finding that achieving long term values and goals (peace of mind, responsibility to others, see Section 4.3.1 Individual Factors Chapter 4) was an important factor underpinning hazard preparedness decisions. The qualitative study also presented the important finding that based on the relevance that people attach to hazard preparedness information presented by civic emergency management agencies can determine the trust or distrust that people have in those agencies. These findings argue for a closer examination of those specific factors of people's social environment that form the context within which natural hazard issues are discussed and acted upon.

The purpose of this chapter is to build on the qualitative findings of the previous chapter and gain a clearer understanding of the social relationships that underpin hazard preparedness decisions. Concurrent with this aim is the identification

of those specific elements of the social environment that help in providing the content for discourse on natural hazard issues. This is important, as tapping into the connections that people make between everyday experiences and hazard preparedness decisions are vital for the further development of social cognitive models that represent individual's cognitive processes that underscore preparedness decisions. To facilitate this Means-End Chain approach was extended to the construction of Cognitive Hierarchical Value Maps (HVM).

This chapter commences with an explanation of why Hierarchical Value mapping was used and describes the process of constructing them. These maps allow for a representation of the relationships between behaviours and cognitive processes to be articulated and modelled (Reynolds & Gutman, 1998). HVM provides a framework for assessing the relationships that exist between attributes, consequences and values. The benefit of using HVM is in further understanding the processes through which people arrive at their decisions regarding hazard preparation, thus expanding the quantitative findings to present a more complete picture of natural hazard reasoning processes.

A further benefit of exploring this approach is in providing a starting point for the development of theories and testable hypotheses that can inform the direction of public education programs. The interview data will be presented in relation to the stages of the Means-End Chain theory; concrete (physical preparation) and abstract (perception of threat) attributes; values (perceptions of safety); consequences (the mediating factor between attributes and values).

5.1 Construction of the hierarchical value maps

Cognitive Hierarchical Value Mapping (HVM) extends Means-End Chain analysis by providing a graphical representation of the relationships that underpin people's decision making. It provides an opportunity to assess the connections between concrete and abstract attributes and deeper level consequences and attainment of values (Reynolds & Gutman, 1988).

HVM provides a structural component to the qualitative data by presenting in graphical form the relationships that people make across the levels of abstraction (attributes, consequences and values). HVM provides an understanding of how hazard behaviours are grouped together and assigned relevance. An understanding of individuals' reasoning sequences is important as it provides an insight into how people construct these reasoning chains in relation to performing hazard preparedness actions. It also allows for a representation of the process by which these cognitive structures might be used in helping to solve problems associated with natural hazard issues (Reynolds & Gutman, 1988).

5.1.1 Method

Data used for this section derived from the same sample used for the qualitative analysis in Chapter 4 (15 participants each from Napier, Benalla and Invermay). As stated in the method section (4.2.1) in Chapter 4 the variability in locations and hazards (earthquakes and floods) aids in assessing the all-hazards applicability of the findings. Responses were coded and grouped into attributes, consequences and values according to the procedure outlined in Chapter 4 (Section 4.2.2) to better represent the hierarchical progression from concrete thoughts associated with natural hazard

preparing to attainment of personal goals and values. From the coding process 37 elements (see Tables 11, 12 & 13) were identified that represented the stages involved in the reasoning process. To facilitate the development of an overall hierarchical model of the reasoning process and the identification of the dominant perceptual elements the laddering procedure (Reynolds & Gutman, 1988) outlined in Chapter 4 (Section 4.1.2) was followed.

5.1.2 Direct and indirect relationships

Following the identification of the 37 elements each individual interview was analysed to identify elements, and more importantly the relationships between individual elements. These connections between elements are referred to as ladders and allow the analysis to demonstrate each individual's unique decision making process. Reasoning ladders were constructed from each individual's interview data (see Appendix E). In this initial analysis each individual's interview data can yield multiple ladders. For example the Benalla interview data (comprising 15 participants) generated a total of 354 reasoning ladders, with the number of reasoning ladders for each individual within this data set ranging from 7 up to 60 ladders. Within each of these individual data sets the number of elements contained within a ladder ranged from 2 up to 6. This gives an indication of the of people's hazard preparedness mental models (see section 5.2.4 – Fatalism, for further discussion).

From the raw data an implication matrix is constructed (see Appendix E) to provide an overall indication of the frequency of relationships for each of the three locations. Each of the 37 elements is ranged both vertically and horizontally and the matrix displays the number of times each element leads to each other element. When

transferring individual interview data into the matrix a decision needs to made whether to count multiple references to the same relationships between elements that each individual makes or to count specific relationships only once, irrespective of how many times an individual mentioned it. While multiple mentions of a relationship may indicate its relative strength it can also serve to artificially inflate the importance of the relationship. For this reason the present study followed Reynolds and Gutman's (1988) guideline that only one specific direct and one indirect relationship per interviewee is included in the implication matrix.

Two types of relationships can be illustrated in this manner, direct (there is a direct relationship between two elements) and indirect relationships (the relationship between two elements is mediated by a third element). Incorporating indirect relationships into the analysis is important as the mediating relationships between variables can offer valuable insights into the complexity of the reasoning process (Reynolds & Gutman, 1988).

This type of information is crucial to developing education and risk communication programs that can map onto peoples' decision processes. Tables 11, 12 and 13 show both the direct and indirect relationships that were identified between all the elements for Napier, Benalla and Invermay. Direct relations are expressed on the left of the colon and indirect relations on the right. For example, Table 11 shows data for Napier interviews. Sources of information lead directly to an adjacent element 21 times and indirectly lead to other elements 41 times. Table 11 also shows that other elements lead directly to sources of information on 16 occasions while indirect paths from other elements number two.

5.1.3 Procedure for constructing the hierarchical value maps

Based on the guidelines of Reynolds and Gutman (1988) an explanation of how the hierarchical value maps were constructed is now presented. In effect HVM summarises the results of the interview data that makes up the reasoning ladders and presents the dominant cognitive processes. The basis of a HVM is the implication matrix.

To construct the map the first element in the implication matrix is consulted (the implication matrices contained in Appendix E show that this element is previous experience). The row is followed until a cut-off level is reached. For inclusion in the map the number of relationships between elements needed to number at least three direct relationships. Reynolds and Gutman (1988) suggest that cut-off values for the number of relationships typically range from three to five, depending on the sample size. Reynolds and Gutman also suggest that cut-off values can include only direct relationships, or a combination of direct and indirect relationships.

Given that Means End Chain Theory and HVM have not been used previously in natural hazard research, and participants for each location number 15, it was decided to use the cut-off value of three direct relationships. The present study also considered HVM with cut-off values of three (2 direct and 1 indirect relationship) and four direct relationships. A cut-off value of three was chosen as it offered a more consistent set of relationships.

These two elements become the first two links in the chain. For example, starting at previous experience in the Napier implication matrix and following the row until the cut-off value of three is reached leads to sources of information. Thus, the first two links in the Napier HVM was previous experience leading to sources of

information. To find the next link the row of the second element is followed until a cut off value is reached, thus three elements in the chain are revealed. Again, using the Napier data as an example, the sources of information row is now followed until the column labelled salience is reached, as these elements have four direct relationships. This process is continued until a chain is completed. The process is then repeated by starting at the second row (hazard knowledge) and constructing a chain based on hazard knowledge. By repeating this process for each of the elements a final hierarchical value map is constructed. Figures 8, 9 and 10 show the completed HVM for Napier, Benalla and Invermay.

The summary tables (Tables 11, 12 and 13) provide information regarding the dominate elements in peoples preparedness decision making. This provides information on whether peoples own accounts of preparedness are consistent with the variables of the Social Predictor Model of Intentions to Prepare (Paton, 2006) (this is covered in the discussion section of this chapter). The hierarchical value maps provide additional information regarding the organisation of people's hazard preparation beliefs. This can assist in further development of the Social Predictor Model and will be discussed in the following chapter. The summary tables can be thought of as the quantitative component, indicating the elements that would be expected to be included in the value maps. The HVM are the visual representations of how the dominant elements identified in the summary tables link together.

For example the summary tables for all three locations (Napier – Table 11, Benalla – Table 12, Invermay – Table 13) show that the attribute elements of 'hazard knowledge', 'previous experience', 'salience', 'relevance' and 'sources of information' have the highest frequencies for all locations. It would be expected that

these elements would dominate in the attribute section of the HVM. Figures 8, 9, and 10 demonstrate that this is the case and expands on this by showing the relationships between these elements and other elements in the attributes, consequences and value sections, indicating how these elements influence peoples reasoning processes.

The tables and maps can also be used to identify those elements unique to each location. An examination of the consequences section of the Napier summary table (Table 11) shows the element of ‘self sustaining’ having moderately high frequencies from other elements (11 direct, 18 indirect). This contrasts with this element having no frequencies (Benalla – Table 12) or very few (Invermay – Table 13). As expected the element of ‘self sustaining only appears in the Napier value map (Figure 8). Again the value map expands on the information presented in the summary table by showing that ‘self sustaining’ is a mediating influence between physically preparing (active preparing) and belief in surviving in the aftermath of an earthquake (survival). Thus, the summary tables and hierarchical value maps provide complementary information regarding important elements in people’s thought processes and how these hazard cognitions are linked together.

Table 11.

Summary of the Frequency of Direct and Indirect Relationships Leading To Another Element and From Another Element for Napier Interviewees.

	Element	To another element Direct:Indirect	From another element Direct:Indirect
Values	Peace of mind	1:0	9:25
	Survival	2:0	9:28
	Responsibility to others	1:0	10:28
	Return to normal	0:0	5:09
	Protection	1:0	13:39
	Protection of possessions	3:01	4:09
Consequences	Trust	1:0	8:11
	Distrust	1:0	6:06
	Transferring responsibility	0:0	2:07
	Shelter	6:0	5:05
	Self sustaining	3:0	11:18
	Physical protection	4.05	13:20
	Unprepared	2.01	15:16
	Reticence in talking	0:0	6:10
	Lack of motivation	1:0	7:08
	Uncertainty	4:01	4:06
	Community Involvement	12:01	13:18
	Confident	3:01	3:08
	Discussing issues	7:01	15:16
	Thinking about issues	6:07	21:13
Attributes	Active preparing	21:17	32:20
	Awareness of preparing	7:05	5:04
	Reticence	2:0	1:0
	Influence of others	8:12	1:02
	Inconvenience	3:02	2:0
	Fatalism	5:03	4:01
	Sources of information	21:41	18:02
	Individual responsibility	5:08	0:0
	Receptive to ideas	0:0	0:0
	Salience	32:37	10:04
	Relevance	24:44	1:0
	Belief in preparing	11:20	8:02
	Ease of preparing	3:03	1:02
	Shared experiences	2:03	2:01
	Early warning	1:03	0:0
	Hazard knowledge	42:71	1:0
	Previous experience	21:51	1:0

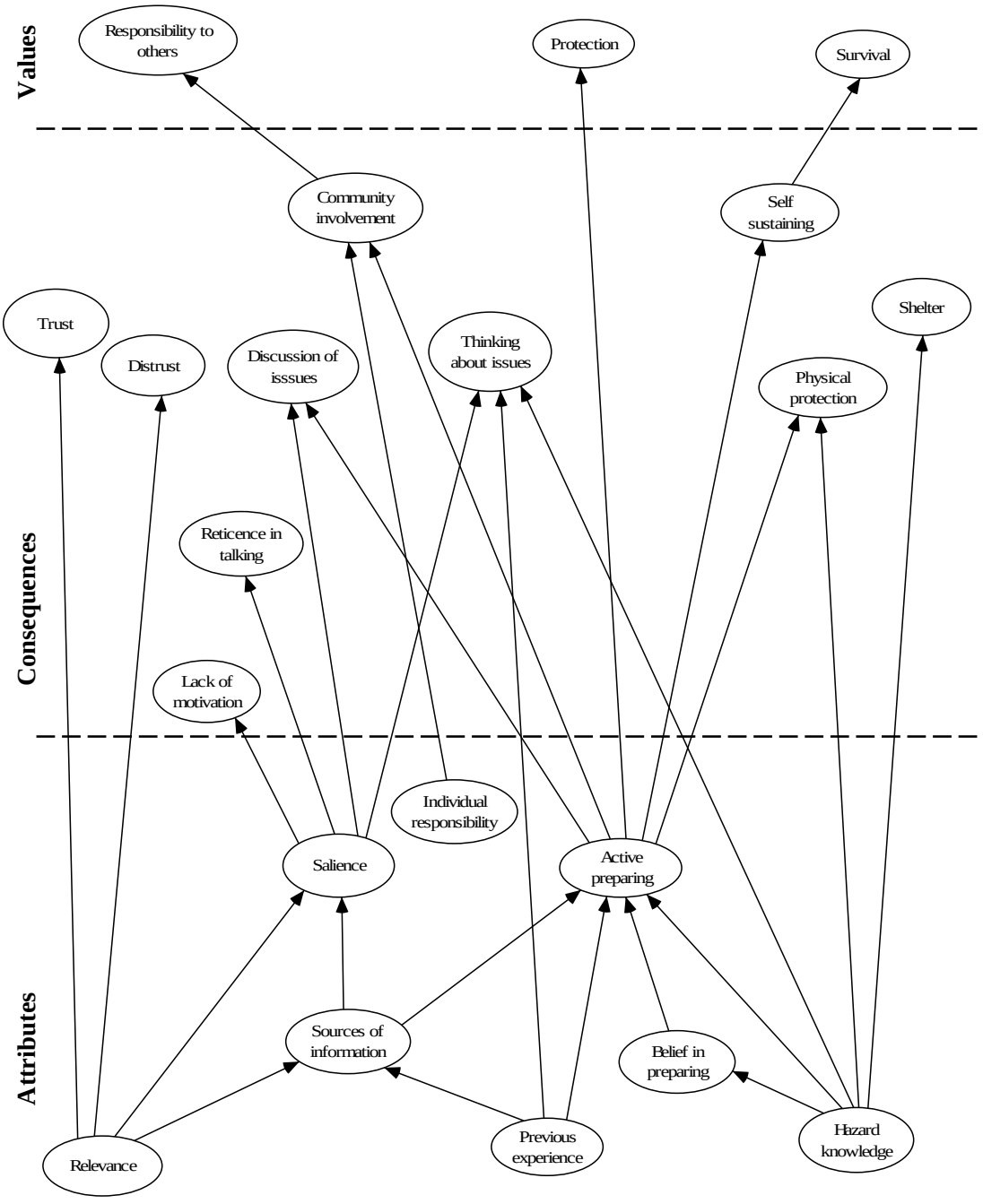

Figure 8. Hierarchical values map for Napier interviewees

Table 12.

Summary of the Frequency of Direct and Indirect Relationships Leading To Another Element and From Another Element for Benalla Interviewees.

	Element	To another element Direct:Indirect	From another element Direct:Indirect
Values	Peace of mind	0:0	9:26
	Survival	0:0	0:01
	Responsibility to others	1:0	13:34
	Return to normal	0:0	0:0
	Protection	0:0	1:01
	Protection of possessions	0:0	13:21
Consequences	Trust	0:0	15:19
	Distrust	0:0	21:17
	Transferring responsibility	0:0	6:03
	Shelter	4:0	3:10
	Self sustaining	0:0	0:0
	Physical protection	2:03	13:10
	Unprepared	0:0	12:09
	Reticence in talking	1:0	13:14
	Lack of motivation	2:0	7:13
	Uncertainty	5:03	18:09
	Community Involvement	14:01	34:19
	Confident	2:0	5:02
	Discussing issues	18:09	26:18
	Thinking about issues	7:01	20:13
Attributes	Active preparing	10:06	31:24
	Awareness of preparing	3:01	4:04
	Reticence	8:0	4:08
	Influence of others	8:17	0:0
	Inconvenience	3:0	0:0
	Fatalism	2:0	9:02
	Sources of information	6:07	14:18
	Individual responsibility	10:05	2:02
	Receptive to ideas	8:0	0:0
	Salience	43:38	14:04
	Relevance	36:17	10:02
	Belief in preparing	9:13	5:03
	Ease of preparing	4:04	2:02
	Shared experiences	9:07	2:0
	Early warning	16:20	11:0
	Hazard knowledge	38:64	4:0
	Previous experience	72:92	0:0

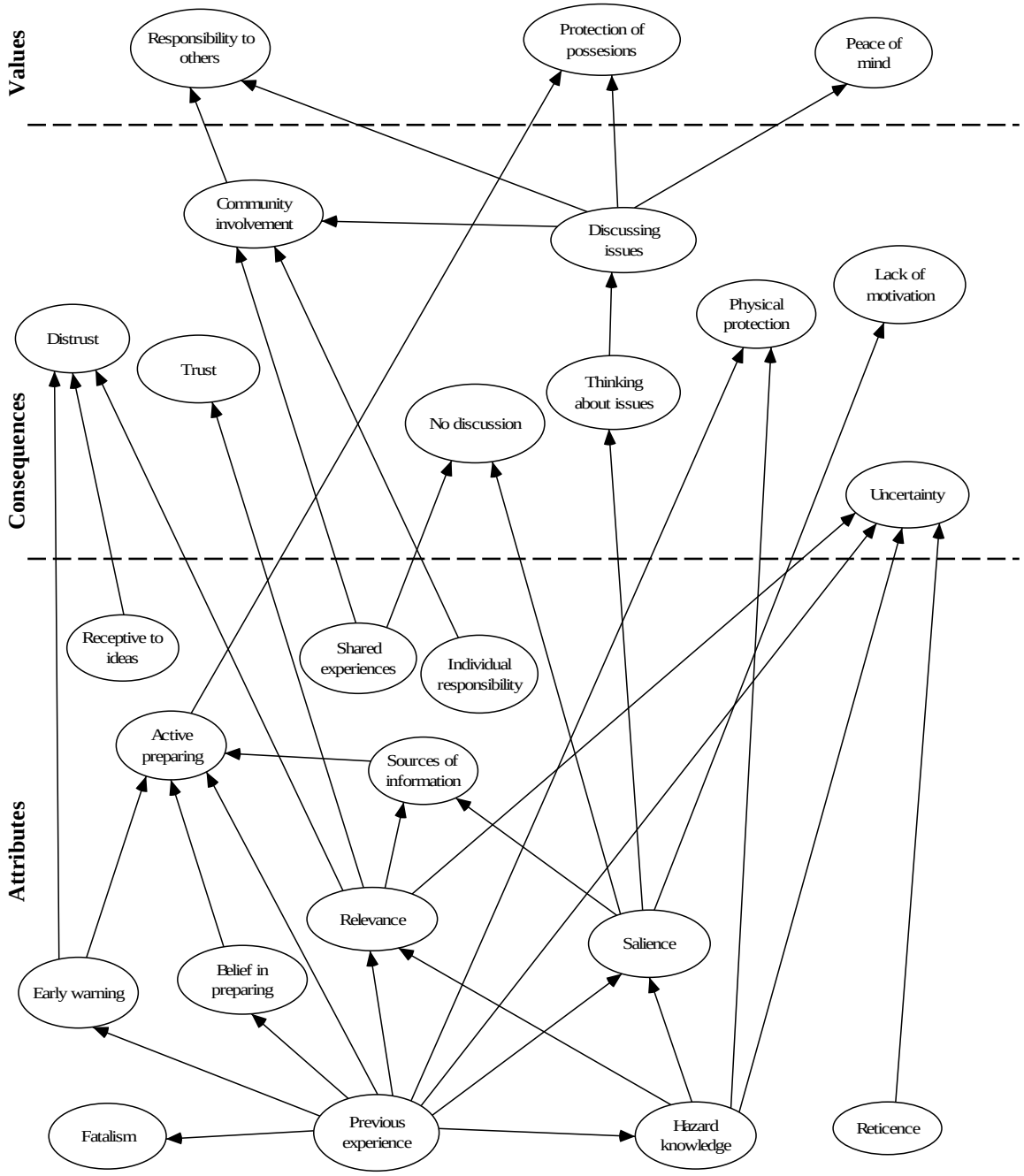

Figure 9. Hierarchical values map for Benalla interviewees

Table 13.

Summary of the Frequency of Direct and Indirect Relationships Leading To Another Element and From Another Element for Invermay Interviewees.

	Element	To another element Direct:Indirect	From another element Direct:Indirect
Values	Peace of mind	0:0	16:29
	Survival	0:0	2:04
	Responsibility to others	0:0	10:26
	Return to normal	0:0	1:04
	Protection	0:0	7:20
	Protection of possessions	0:0	7:14
Consequences	Trust	2:01	17:21
	Distrust	2:02	16:12
	Transferring responsibility	0:0	1:05
	Shelter	2:01	4:16
	Self sustaining	4:0	4:04
	Physical protection	5:02	9:07
	Unprepared	0:0	40:30
	Reticence in talking	0:0	4:05
	Lack of motivation	2:0	4:09
	Uncertainty	5:0	6:10
	Community Involvement	5:0	20:16
	Confident	0:0	0:0
	Discussing issues	18:14	25:16
	Thinking about issues	7:04	15:09
Attributes	Active preparing	11:02	9:01
	Awareness of preparing	4:04	13:13
	Reticence	4:0	17:15
	Influence of others	20:40	1:0
	Inconvenience	10:03	1:03
	Fatalism	2:0	4:02
	Sources of information	15:42	10:02
	Individual responsibility	0:0	0:0
	Receptive to ideas	9:03	1:0
	Salience	53:24	17:06
	Relevance	40:28	8:01
	Belief in preparing	2:09	2:0
	Ease of preparing	5:0	0:0
	Shared experiences	19:06	1:02
	Early warning	3:13	1:0
	Hazard knowledge	38:73	9:01
	Previous experience	15:32	0:0

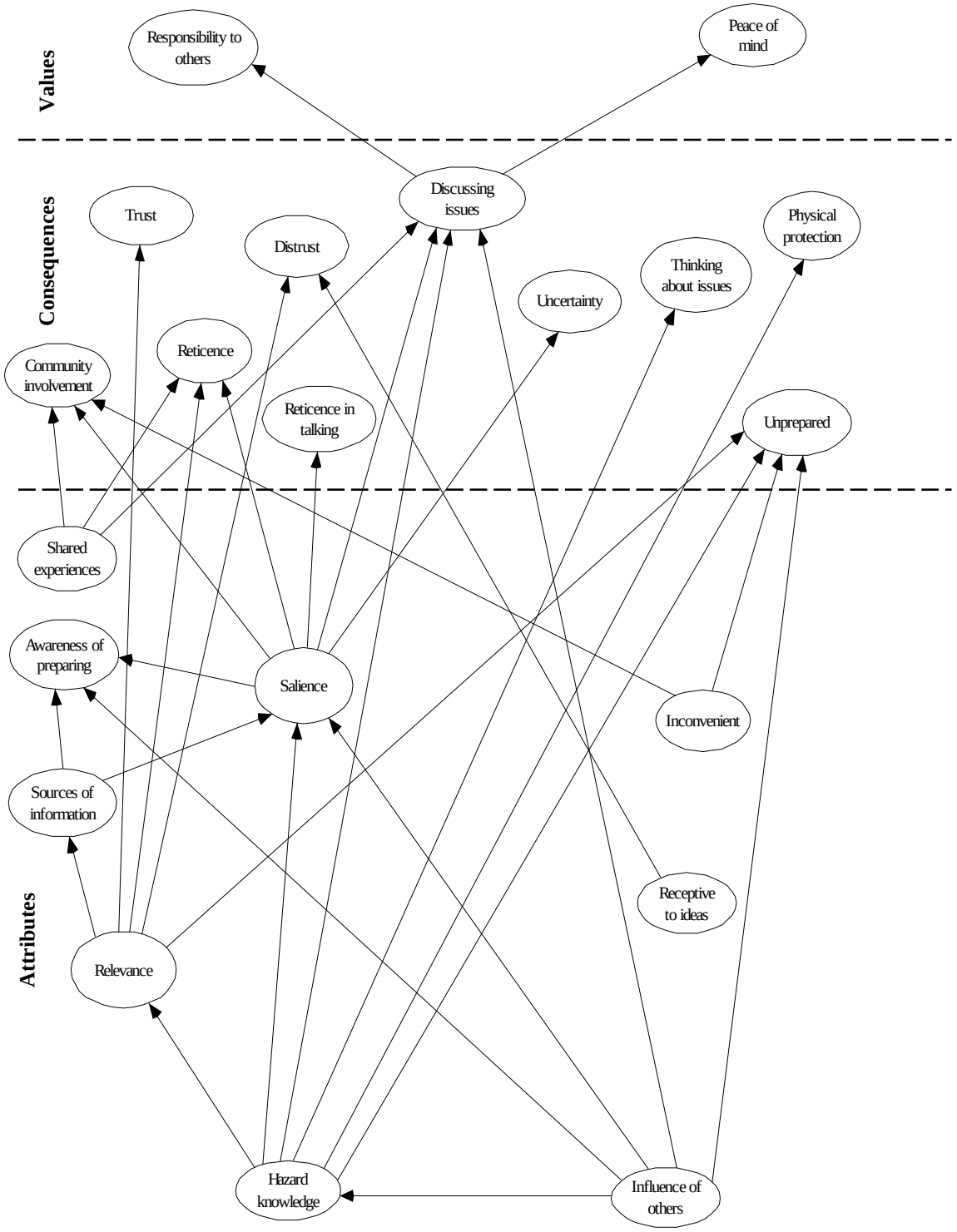

Figure 10. Hierarchical values map for Invermay residents

The frequencies presented in Tables 11, 12 and 13 reveal common relationships between behaviours and cognitive processes that people in earthquake and flood locations make. Attributes represent the initial beliefs that people associate with preparing. Because of this it is dominated by links ‘to another element’. The summary tables show that ‘previous experiences’ and ‘hazard knowledge’ had consistently high frequencies for all three locations (Napier – Table 11, Benalla – Table 12, Invermay – Table 13). This indicates that awareness of hazard threat is a motivating factor in initiating hazard cognitions. This needs to be tempered, however, by the other elements with consistently high frequencies; ‘salience’ and ‘relevance’ (see Tables, 11, 12, 13). This suggests that hazard issues need to be at the forefront of people’s thoughts before they are acted on.

Consequences are the mediating factor between attributes and values, and this is reflected by links both to and from other elements. The data (Napier – Table 11, Benalla – Table 12, Invermay – Table 13) also show that ‘community involvement’, ‘discussing issues’ and ‘thinking about issues’ are among the highest frequencies for consequences. This can be conceptualised as being representative of individual and community attitudes to hazard preparation. The fact that these elements are also among the highest frequencies to another element and from other elements indicates that these are important mediating factors.

Values represent the deepest levels of cognition according to Means End Chain Theory. It is the expectations that people attach to preparing. As such it is dominated by links ‘from another element’. The summary tables (Napier – Table 11, Benalla – Table 12, Invermay – Table 13) confirm the common values that were discussed in the previous chapter. For all three location ‘peace of mind’ and ‘responsibility to

others' were the overriding motivations for preparing. The high number of frequencies of 'protection' was not surprising given that this element was addressing the protection of family and self. However, what was unexpected was that the Benalla data indicated almost no frequencies for 'protection'.

What these data show was that the frequencies for 'protection of possessions' was on a par with 'responsibility to others'. This suggests that while attaining peace of mind is a dominant motivation in all the locations for preparing how it manifests itself is different for different locations. The remainder of this chapter will now present a more in-depth discussion of the relationships between elements and between attributes, consequences and values.

5.2 Attributes

According to means end chain theory attributes are the associations made with certain actions. These can be tangible and physical behaviours necessary to perform the behaviour and the abstract thoughts that people attached to particular behaviours (Gutman, 1982, 1997). In a natural hazard context these are the physical actions such as securing household furniture and more abstract connections such as expectations and perceptions of risks. The relationship tables and the reasoning maps show that residents in Napier (Table 11, Figure 8), Benalla (Table 12, Figure 9) and Invermay (Table 13, Figure 10) not only associate actual preparedness behaviours with preparing but also associated abstract attributes with preparing. This indicates that while individuals considered physical behaviours such as actually performing preparation activities as important to the context within which these activities were to be performed were equally important.

5.2.1 Hazard awareness

The tables and Hierarchical Value Maps (Napier – Table 11, Figure 8; Benalla – Table 12, Figure 9; Invermay – Table 13, Figure 10) for all three locations demonstrate the role of awareness of hazards in initially motivating people to consider hazard preparation activities. Having knowledge of a particular hazard is an important influence on preparedness activities (Lindell & Whitney, 2000). As the quotes relating to hazards awareness in Table 14 show all participants indicated that they were aware, to varying degrees, of the susceptibility of their locations to the effects of natural hazards.

All of the New Zealand interviewees are cognisant of the susceptibility of Napier to natural hazards in general and earthquakes in particular, with 12 of the 15 interviewees referring to the 1931 earthquake that devastated Napier. This event was specifically mentioned as a reason for preparing their households. A number of the Napier responds referred to other natural hazard events when citing reasons for preparing. Three of the 15 interviewees referred to the major fault line that runs the length of New Zealand, two (of 15) mentioned the threat of tsunamis and two (of 15) other respondents spoke about the potential volcanic threat to Napier.

Tasmanian residents were also aware of the susceptibility of their suburb (Invermay) to flooding, with five respondents (of 15) referring to the 1929 flood as a specific catalyst for preparing. This awareness was predominately concerned with knowing where their dwelling was located in relation to the flood level reached in 1929. Having this knowledge helped to inform the decisions of these residents regarding the adoption of flood preparation measures. Another concern expressed by six of the interviewees was the issue of silt build up in the Tamar River. This created

a degree of uncertainty in the minds of these residents as the change in river conditions could impact on them in the event of a major flood event.

Benalla residents were aware of the susceptibility of the surrounding area to flood events as a result of knowledge of the flood history of the Benalla area. For most Benalla residents this flood history knowledge stemmed from their experiences in the 1993 floods. This highlights that in flood affected areas awareness of hazard threat is based on other influences. For Benalla residents it is previous experience and for Invermay residents it is the influence of others.

Table 14.

Participant Quotes Relating to Attributes (Hazard Awareness & Previous Experience) of the Hierarchical Value Maps.

	Hazard awareness	Previous experience
Napier	Well we had the 1931 earthquake here and that was pretty devastated so, and we have earthquakes all the time so it's just a matter of time before we have another one as far as I'm concerned, so better be prepared" (Heather) I live in an area that's already had a major earthquake, 1931 there was a very bad one here. I'm aware from research I've done into that earthquake the extent of the damage, and the extent of the effect on the population (Alan).	Well you know when I was a kid at school we got earthquakes that were quite, well not frequently, but we got earthquakes and the teachers would say well get under the desk. Just crawl under the desk and stay there till it was over (Bruce). I think again this is from my knowledge of previous earthquakes, from seeing the results, from being involved in civil defence work, not so much with earthquakes but I've been involved with river work for a long time and flooding and that sort of thing (Alan).
Benalla	Because they say a flood happens here about every 10 years and we're probably pretty close, getting pretty close to that from what people have told me (Julia). They might say "it's only happened once in 100 years" but that doesn't mean it's not going to happen next year, again (Richard).	My experience is that I've been through a house fire so I have some personal experience of a natural, well not a natural disaster, but a disaster in my home and I lost everything (Julia) It was quite traumatic; I certainly wouldn't want to go there again. As I say I was really lucky that it didn't quite come into my home and I wouldn't want it to" (Karen)
Invermay	Because where my house is it, in the last flood there was water here and in the 1929 flood it would have flooded if it was here because it wasn't built until 1935 I think, we're at the bottom of the hill (Carol). …and I know where the 1929 flood came too in the street (Martin).	I've lived in a lot of flood prone areas in Australia… yeah I've certainly been through floods before on a number of occasions at various different levels, cyclones and other bits and pieces and storm surges and all those sorts of things (Grant). I've lived in Invermay when there've been other floods…I've seen it happen before (Martin).

5.2.2 Influence of others

Summary table 13 and the HVM (Figure 10) indicate that Invermay residents' knowledge of hazards stemmed from the influence of others. This is consistent with the findings of the Social Predictor Model of Intentions to Prepare (Paton, 2006) (Figures 3 & 6 Chapter 3) which identified the role of community participation in hazard preparing. However, the interview data has provided addition information regarding which members of the community people turn to and the type of information they are seeking. The quotes presented in Table 15 highlight that the influence of family, friends and neighbours can inform how people perceived the threat of floods. For instances, Phillip discusses how he is prompted to think about hazard preparedness due to his family's involvement in volunteer emergency management. Similarly Cara indicated that the hazard information that her children received at school encouraged her to think about preparing.

Individuals living in area affected by natural hazards can rely on local knowledge and folklore as a way of assessing the level of threat. Residents of Invermay reported that a valuable source were long time residents. Participants used the information and personal experiences of these residents when making hazard preparedness decision. Individuals living in area affected by natural hazards can rely on local knowledge and folklore as a way of assessing the level of threat. Residents of Invermay reported that a valuable source were long time residents. Participants used the information and personal experiences of these residents when making hazard preparedness decision.

Table 15.

Invermay Participant Quotes Relating to the Influence of Others in Natural Hazard Preparedness Decisions

No, I think it just comes up every now and again because the family members, a lot of them are members of the SES. They've been called out and they come and see you and say are you aware of these things now, it's so quick, you've got to do this, you've got to do that, you've got to make sure. See you might get a Christmas present of a rechargeable torch or a first aid kit or something like that, add to your already number of first aid kits you've got, you know, but they're sort of in that sort of frame of mind (Philip).	There's a guy across the road from me, an old guy I think he's late 70's, and he's lived in the area all his life and he sort of expresses that there's really, well not that there's nothing to worry about but, worry about" (Jenny).
At the school, my children go to Invermay Primary School, they're been doing quite a bit about…getting prepared for floods which was a bit of an eye opener for me because they come home with ideas that I hadn't thought of actually…I was amazed when the kids came home, little things I hadn't even thought of, never occurred to me so I thought it was really good the kids had that kind of learning, to bring home and tell all the parents and let people know (Cara).	My neighbour was an old fellow who lived here all his life and he passed away last year. He was in his late 80's and he said when the last big flood came, like the river burst its banks basically, he was here and these 2 houses were here, his and mine, and he said the water came up to the street but it didn't actually come into our two yards (Kate). I've talked with residents that lived in Invermay during the 1929 floods and been told that my property was not affected, so my decisions are based on that knowledge (Jenny).

The Invermay data suggests that one avenue that people explore to reduce uncertainty is that of folklore. Individuals reliance on folklore has a source of information can occur if people have restricted or no access to relevant information (Kasperson, Golding, & Tuler, 1992). The prolonged reliance of folklore in informing preparedness decisions can mean that it can take on the appearance of fact (Anderson-Berry, 2003). Pfister (2002) reported that prior to a major flood event in Grafton NSW people used long term residents as a trusted source of information. These residents were able to indicate the likely areas at risk of floods based on their previous experiences with floods.

What this indicates is that beliefs regarding the probability of flooding in Invermay and the effectiveness of preparing are a socially constructed activity. The actions of others can be an important reference point for people trying to make sense

of the surrounding environment (Barnes, 2002). This is particularly apt for people living in areas affected by an uncertain event such as a natural hazard. In order to reduce the uncertainty associated with natural hazards people make use of social networks to reduce the associated uncertainty and to help in returning to a normal way of life (Gordon, 2004; Silberbauer, 2003).

5.2.3 Previous Experience

Data for both Napier and Benalla (Figures 8 & 9) indicate that previous experience of natural hazards was a motivating factor in preparedness decisions. Table 14 presents a selection of quotes detailing respondents' previous experience of floods. This was confirmed in the summary tables for these areas (Tables 11 & 12). However the tables show that Benalla had over three times as many frequencies for previous experience as that of Napier. The Benalla data (Table 12) shows 72 direct and 92 indirect relationships with other elements while the Napier data (Table 11) shows 21 direct and 51 indirect relationships. This indicates that previous experience of flood events was a major factor underpinning Benalla residents' preparedness decisions. Of the 15 Benalla residents interviewed 12 referred to their experiences in the major flood of October 1993. The 3 remaining interviewees were not living in Benalla at the time of the flood event but indicated their awareness of the event and the susceptibility of their households to a similar flood event.

One explanation for the high Benalla frequencies could be the recent experience with a major hazard event (Benalla flood of 1993 as opposed to the Napier earthquake of 1931). This relatively recent experience could have influenced Benalla

residents' cognitive processes regarding flood preparation. Previous experience of natural hazards can heighten an individual's perception of the risk associated with the particular hazard (Sjöberg, 2000). Anderson-Berry (2002) found that in the aftermath of cyclones people were more likely to discuss household emergency mitigation plans.

Previous experience can be seen as an initial motivating factor in preparing through the pertinent issues attaining salience (Mileti & O'Brien, 1992; Perry & Lindell, 2008; Zaalberg, Midden, Meijnders, & McCalley, 2009). Mileti and O'Brien have contrasted the experiences of people who had direct experience of earthquakes and those who had little or no experience. Previous earthquake experience proved an impetus for people to prepare and to make earthquake issues more salient.

However, what is not clear from the interview data of the present study is whether the salience attached to natural hazard issues is an artefact of people's previous experience with these hazard events. The individuals who responded to this study could be indicative of this, while those individuals who did not respond could hold the belief that the risks associated with natural hazards have dissipated. This highlights the main argument of the present study in general, and the Hierarchical Value Maps in particular, that it is not one factor alone (i.e. previous experience) that influences people to prepare but a combination of factors that reflect their general everyday experiences.

5.2.4 Fatalism

While the data demonstrated that people are aware of the consequences of the natural hazards that are endemic to the area that they live in, it is in and of itself no guarantee that they will automatically initiate preparedness activities (Anderson-Berry, 2003; Davis et al., 2003; Lindell & Whitney, 2000). This was demonstrated by the sense of fatalism that pervaded some respondents' attitudes to hazard preparedness. This sense of fatalism stemmed from individuals' previous experience of earthquakes or floods. The common theme expressed by respondents was that in the event of a major event there was nothing that they could do to minimise the consequences.

Fatalism needs to be differentiated from negative outcome expectancies. Even though both appear at the beginning of the decision making process negative outcome expectancies represent an individual's negative beliefs regarding preparing. The beliefs related to fatalism are more directed to the threat itself. In other words, negative outcome expectancies reflect an evaluative process while fatalism reflects a disposition.

Fatalism describes those people who believe they have no control over outcomes. People with a fatalistic point of view perceive events such as earthquake and floods to be uncontrollable, and are less likely to take actions to ameliorate the consequences of these events as these actions are perceived as having little effect (McClure et al., 1999). McClure, Sutton and Sibley (2007) have suggested that areas at risk of earthquakes people with a fatalistic outlook are assuming that factors contributing to earthquakes (i.e. magnitude, intensity) have a uniform effect (same

level of devastation over a widespread area). However, McClure et al. (2007) argue, earthquake effects can cause varying degrees of damage (i.e. due to differing levels of building design), some of which can be protected against. Perceptions of fatalism could be reduced if people are provided with specific information regarding the extent of a natural hazard, and degrees of damage caused by the hazard (McClure et al., 2007).

While interviewees from all locations (Napier - 2 interviewees of 15, Benalla – 6 of 15, Invermay – 3 of 15) suggested fatalism as an impediment to preparing it was only the Benalla data that could be included in the HVM (see Figure 9). This may indicate a simpler causal model that is being used to explain mitigating the consequences of flooding.

This was alluded to in Section 5.1.2 (direct and indirect relationships) with the initial analysis of the qualitative data for Benalla. To reiterate, this analysis examined each participant's interview and identified any relationships between elements. These relationships are referred to as ladders, and for the Benalla data the number of elements in each individual's ladder ranged from only two elements up to a maximum of six elements.

The Benalla data revealed a total of 83 (out of 354) ladders with only two elements and 12 ladders with six. In contrast, the Napier data showed 39 (out of 255) ladders containing two elements and 21 ladders with 6 elements. While this does not constitute conclusive evidence it does provide an indication of the relationship between simple causal models and fatalism. More simple causal models tend to focus on one or two reasons as to why damage as occurred, while more complex models

incorporate multiple reasons thus, providing a more complete picture of natural hazard consequences.

5.2.5 Relevance and salience

The hierarchical value maps for all three locations (Napier – Figure 8, Benalla Figure 9, Invermay – Figure 10) identify the central role of the relevance and salience of hazards and related issues in preparedness decisions. This was confirmed by the relationship summary Tables 11, 12 and 13 that show that these two elements have a high frequency of elements leading to them as well as from them. This demonstrates the integral roles that salience and relevance play in hazard preparedness decisions. It shows that these two elements are a vital component in any hazard mitigation programs.

The importance of relevance to hazard decisions has already been discussed in Chapter 4 in relation to people distinguishing between trust and distrust in emergency management authorities. If individuals perceive that information related to natural hazard preparedness is relevant to their needs it is more likely that it will be attended to (Vogt et al., 2005; Whitney et al., 2004). This perception that information needs to address people's requirements reflect the key role of empowerment in the Social Predictor Model of Intentions to Prepare (Paton, 2006) (Figures 3 & 6, Chapter 3).

Salience stemmed from awareness of natural hazards, previous experience of the hazard, relevant sources of information (and for Invermay interviewees the influence of others) (see Figures 8, 9 & 10). This would indicate that people may understand the significance of preparing for natural hazards but need to be convinced

of its importance before adopting protective measures. As the Benalla data indicates (Figure 9) the previous experience that the interviewees had in the 1993 flood influenced the salience that was attached to subsequent flood issues. As discussed above (Section 5.2.3 – Previous Experience) individuals that have prior experience with natural hazards are more likely to adopt protective measures (e.g. Mileti & O'Brien, 1992; Perry & Lindell, 2008). It is this recency effect regarding previous natural hazard experience that can contribute to levels of hazard salience.

When assessing levels of preparedness in areas at risk of volcanic activity Davis et al. (2005) found that those people living in areas that had no recent experience of volcanic events (60 years since last event) were less likely to rate volcanic preparation as being salient. While people rated issues related to volcanic events as important other areas such as crime, health and lack of public services were viewed as being more important. Davis et al. contrasted this with an area that had recent experience of volcanic activity (6 months previously) where issues related to hazard preparation were rated more highly than other life issues. Salience provided an impetus for people to seek out information and by searching for information in turn made the issue of hazard protection more salient. This is an important consideration for hazard mitigation programs as it indicates the need to think about preparedness in relation to other life demands.

Table 16.
Participant Quotes relating to Attributes (Salience & Active Preparing) of Hierarchical Value Maps.

	Salience	Active preparing
Napier	It's the same reason that I don't spray my fruit trees or, you know, things you intend to do and you never get around to. I can imagine if there was a severe earthquake in another part of the country tomorrow that would enough of a jolt if anything. A wake up call, you know to do something about it. There hasn't been yet and I haven't got around to it" (Claire). It's real in their minds and they know it's real, and it's because we have earthquakes all the time they know it could happen (Heather).	Everything that can fall is fixed or tied, or glued. We've got water put away, we've got foodstuffs put away, we've got an evacuation plan because our house is two stories, and we've had the fire department in having a look at the best place for us to get out in case of fire or earthquake (Michael). Everything is fixed to the walls for a start. The hot water cylinder is actually built in so it can't fall out. We have a full medical kit…So we've actually basically got everything here, plus provisions for water, we've probably got three months of canned food because my husband works at Watties that makes them (Heather).
Benalla	Well it depends on your circumstances. If you live in an area affected by floods it's very important, if you don't it's not important at all (Chris). Because floods in real terms are such a minor part of the community activity, like we're not going to run around and talk about the sky falling in everyday are we (Kevin)?	You know, I guess in my home I have everything up, stored, everything is important, stored up high (Karen). The biggest thing to do there is to actually be ready to cut your fences and drop them out of the way because it artificially raises the level, um around our house, for instances, we probably could have reduced the level of water in our house by 5 or 6 inches by just early release of those fences and also what sort of things you have, the type of fencing around your house (Kevin).
Invermay	Well, again as I say there are other issues in life that are…more pressing I guess, you know, it's not a life or death issue. It's just one of those things that sits in the back of your mind" (Josh). I probably rate it as high as a fire, you know, I'm always conscious of an issue like a fire, for example, you know, they're important issues but it's not something that stands out by itself (Martin).	So we've got plenty of, we do a fair bit of camping so we're got plenty of water containers, batteries, rechargeable batteries all those things, the house has been re-wired so we can cut off the power and the power coming in is in an elevated position (Philip). I've got a very good house insurance, contents insurance. But I've isolated a few things in the house and of a night, I sound silly, I turn everything off before I go to bed because I know water and electricity don't mix. So those sorts of things I've done (Ian).

5.2.6 Sources of Information

Once a hazard situation attains salience for individuals they will then seek out the relevant information that is required to make preparedness decisions (Lion et al., 2002). The sources of information that respondents accessed were generally the same for the three locations. Interviewees stated that the local council, civil defence/SES would be useful sources to access. The media, either through newspapers and/or television was also mentioned as a possible source of information.

When questioned about where to access relevant information residents of both Benalla and Invermay indicated more general sources of information (e.g. newspapers, council, library) rather than any specific place. One specific source of information that four (of 15) Invermay residents indicated made flood issues salient were flood warning signs that the Launceston City Council has placed in various locations in the Invermay area. These markers indicate the highest recorded level of flood waters in the 1929 flood and the expected height in a 1 in 20, 1 in 50 and 1 in 100 year floods.

This is in keeping with people's desire to reduce uncertainty in order to lessen the associated apprehension (Bandura, 1997). The connection between relevance and sources of information reflect the empowerment-trust relationship identified in the Social Predictor Model of Intentions to Prepare (Paton, 2006) (Figures 3 & 6, Chapter 3). When faced with uncertainty people will seek sources of information that will lessen this uncertainty. Which sources a person attends to depends on the trust levels associated with the source (King, Goudie, & Dominey-Howes, 2006; Pfister, 2002 Siegrist & Cvetkovich, 2000; Sjöberg, 2000). The link between uncertainty, relevant

sources of information and trust was demonstrated by Pfister (2002). When faced with an imminent flood event residents of Grafton NSW heeded advice given to them by the authorities, despite very few people actually believing that they and the city were at risk from flooding. Pfister argued that this demonstrated that when faced with uncertainty people will attend to sources of information that they trust.

5.2.7 Active preparing

The Social Predictor Model of Intentions to Prepare (Paton, 2006) (see Figures 2 and 3, Chapter 3) demonstrated that the decisions of individuals to actively prepare are not made in a vacuum but with reference the social environment within which they live. The HVM illustrate that these decisions are made with reference to both the physical and social environment. For Napier and Benalla (Figures 8 & 9) residents' decisions to actively prepare are based on individual previous experience, knowledge of the hazard and the sources of information that are consulted. Table 16 provides some examples of the practical measures that residents adopt to ensure their preparedness.

Even though a number of Invermay residents had engaged in preparation activities the element of 'active preparing' could not be included. However, Invermay residents did indicate they had an awareness of preparing. That is, respondents knew that preparing was important but had not actually engaged in it. This could be indicative of the fact that Invermay residents have not had recent experience of a major flood event (the last major flood in the Invermay area was in 1929). While

Invermay interviews view flood preparation as an important issue they may consider other issues to be of more importance.

5.2.8 Belief in preparing

An important influence on active preparing for Napier and Benalla residents was a belief in preparing. To hold these beliefs people need to believe that these behaviours will result in positive consequences. While they may perceive that nothing can stop either floods or earthquakes the actions they initiate can minimise the damage associated with natural hazards. For Benalla residents (5 of 15 interviewees) this belief stemmed from their previous experience the 1993 major flood event. Interviewees indicated that they had used these measures or seen them in action and believed these measures could mitigate the effects of future flood events. Napier respondents (6 of 15 interviewees) based their beliefs in preparing on their knowledge of New Zealand's susceptibility to natural hazards, rather than previous experience.

This finding adds to those of the Social Predictor Model of Intentions to Prepare (Paton, 2006). While the model highlighted the integral role of role of positive outcome expectancies (see Figures 3 & 6 Chapter 3) the qualitative data has specified the factors that underpin people's beliefs in the efficacy of preparing. This suggests that hazard intervention programs could highlight the threat inherent in natural hazard events as a motivating factor in people preparing.

However, care needs to taken with this approach. If the issues presented are too complex or difficult to understand people may not attend to this information as they may believe they do not have the necessary skills and knowledge (Siegrist &

Cvetkovich, 2000). This approach could also facilitate a sense of fatalism as people could view hazards events as being uncontrollable (Cowan, McClure, & Wilson, 2002). Invermay residents did not indicate a belief in preparing perhaps due to their limited experience with a major flood event (as discussed in previous section).

5.2.9 Early warning

One influence on active preparing that was unique to flood areas, specifically Benalla, was early warning. Benalla residents reported that an early warning system would facilitate them preparing. This view was prompted by previous experiences with floods. Respondents who had lived through the 1993 flood were of the opinion that they could have been more prepared if they had had an earlier warning. As the HVM for Benalla (Figure 9) shows, early warning can also lead to distrust in authorities. Technology advances were also cited as a reason why early warning would be a motivating factor for preparing. This has gained currency as the previous system was based on upstream human observation. The following quote highlights this difference.

> *"…and we got adequate warning to get out of our place by the system, I don't know whether there was much of a system it was just observation but now there's an electronic warning system built in and there'd be plenty of warning given" (Darryl)*

However, the problem with this is people developing an over reliance on technology to provide an indication of when to initiate preparation procedures. In

effect, responsibility for preparing can be transferred from the public to government authorities. This has been noted in flood affected areas where the public have unrealistic expectations regarding protective measures (Vari, 2002). This has been due to government authorities promoting the effectiveness of flood mitigation work to the extent that the public believe they are protected from all flooding (O'Brien & Payne, 1997). Hall (2007) has commented on flood mitigation strategies becoming too dependent on technology. Early warning systems, according to Hall, should be a combination of the available technology, local emergency management agencies that are conversant with local conditions and local flood history and the development of a public capacity to respond appropriately.

Residents of Napier gave no indication that they considered early warning systems when dealing with authorities. People in Napier may have more complex causal models causing them to assess more variables (they have access to and are exposed to more information re: earthquakes) before making a decision. Meaning that they perceive earthquakes as being unpredictable and so little chance of having an early warning (Whitney et al., 2004). People in Benalla and Invermay may have more simplistic causal models meaning that they perceive of floods as being more predictable than earthquakes. This may be due to them not being exposed to as much information as Napier, and may explain the prevalence of early warning thinking in flood affected areas.

The data presented here demonstrates that the attributes that people attach to preparation activities are both concrete and abstract. People consider the performance of physical activities (i.e. active preparing and seeking out sources of information) in

relation to preparing. The findings also show that abstract attributes (perceptions of threat) influence hazard preparation decisions. When people consider hazard preparation issues their previous experience with, and knowledge of, natural hazards are factored into their preparedness decisions.

These factors are also influential in the salience that is attached to natural hazard cognitions. The findings regarding the concrete and abstract attributes associated with hazard preparation suggests that providing information on hazard mitigation is not enough. This is an important point for emergency management authorities. To facilitate uptake of hazard protective measures civic emergency management agencies need to engage with at risk communities to understand the extent that perceptions of threat affect the salience that people accord natural hazard issues. The attributes that people associate with hazard issues can have positive or negative consequences. The next section will discuss the key consequences that were identified by the cognitive hierarchical models.

5.3 Consequences

Consequences are the mediating factors between attributes and values. People select those behaviours that will have beneficial consequences, while values endow consequences with positive or negative evaluations. In other words, the importance that a person attaches to a value invests an importance in the consequences that lead to that value (Gutman, 1982). As such, consequences are a vital link in Means-End Chain theory as they invest an individual's actions with positive or negative

evaluations, thus determining the likelihood of these behaviours being repeated (Gutman, 1997).

5.3.1 Thinking and talking about natural hazard issues

The summary tables (Tables 11, 12 & 13) for all three locations indicate that thinking and discussing issues related to natural hazard preparation are important mediating factors. This was demonstrated with the consistently high frequencies of relationships to others elements and from other elements. For example, the summary table for Benalla (Table 12) shows that 'Discussing Issues' linked to other elements (i.e. other consequences or values) a total of 27 times (18 direct relationships, 9 indirect relationships). Table 12 also shows that other elements (i.e. other consequences or attributes) linked to 'Discussing Issues' a total of 44 times (26 direct relationships, 18 indirect relationships). This was confirmed in the hierarchical value maps. In the flood affected areas (Figures 9 & 10) the element of 'Discussing Issues' was the common mediating factor between the attributes of hazard knowledge, salience and the values of responsibility to others and peace of mind.

The Napier data (Figure 8) shows no links between 'Discussing Issues' and values. However, Figure 8 does show that 'Community Involvement' is a mediating factor between attributes and values. While not specifically addressing the articulating of hazard issues 'Community Involvement' would be incorporating thinking and talking given that these processes are inherently social activities (Bagozzi, & Dabholar, 2000; Gergen, 2003).

One of the key influences of thinking and talking about hazard issues was the salience that was attached to natural hazards. The quotes contained in Table 17 illustrate that issues relating to natural hazards need to be uppermost in people's minds before hazards, their consequences, and how the risk posed might be mitigated, is thought about and discussed. The value maps for all the locations (Figures 8, 9 & 10) show that the attributes of 'Hazard Knowledge' and 'Previous Experience' contributed to people thinking about and discussing hazard issues. Anderson-Berry (2003) has reported that prior experience of the consequences of cyclones influenced people to discuss hazard mitigation strategies.

If natural hazards are not salient then people are less likely to talk about them. Residents indicated that they were reticent to discuss natural hazard issues with others as it was not at the forefront of their mind. Figures 8, 9 and 10 indicated that for all locations the consequence of 'Reticence in Talking' was a result of a lack of salience attached to hazard issues. This is not to say that residents did not think earthquake and flood issues were not important, it is that these issues were not readily recalled.

This indicates that one way to motivate people to adopt natural hazard preparedness activities is to engage them in discussion regarding requirements. This has the effect of making these issues salient. As the data shows salience is a major factor in people thinking about and adopting natural hazard preparedness activities. In effect this creates a feedback loop where discussion of preparedness promotes adoption of these strategies, which in turn leads to people discussing them. However, this could also be indicative of the cross sectional nature of the present study.

Because interviews were conducted at one point in time respondents were being assessed at different stages of their decision making process. It is likely that some people were at the beginning of the process, i.e. some people assessing outcome expectancies while others had already completed this stage and had moved on to preparing, or had decided against it. This makes it difficult to accurately gauge where people are in the feedback loop people are, or whether a feedback loop exists.

One influence on discussing natural hazard issues, and one unique to Napier participants was the performance of earthquake preparation behaviours (i.e. active preparing). People in Napier indicated that performing preparation activities resulted in them discussing these issues. It was felt by Napier residents that it was important to pass on this information to others. This was also an important outcome of discussing issues for Benalla and Invermay interviewees. The Benalla quotes contained in Table 17 provide an example. Kevin is referring to his experiences in the 1993 flood and the importance he attaches to informing others (particularly new residents to Benalla) of flood consequences. Margaret, who experienced a major flood event in another location, feels it is important to alert other Benalla residents to the potentially devastating effects of major floods. The influence of discourse on hazard preparation has been noted in areas at risk of cyclones. Anderson-Berry (2003) found that discussion of household emergency plans can increase the likelihood of individuals acting on those plans.

The finding that thinking and talking about natural hazard related issues is an important mediating factor between attributes and values is consistent with the core concepts of Means-End Chain theory (Gutman, 1982; 1997) and the Social Predictor

Model of Intentions to Prepare (Paton, 2006). Means-End Chain Theory argues that the discourses that people engage in with others are reflective of reasoning processes. The Social Predictor Model accords a central role to discourse as a means of determining the level of knowledge people accrue to reduce the uncertainty associated with natural hazards. This has implications for civic emergency management authorities when instituting hazard mitigation strategies. As discussed in Chapter 2 (section 2.1.3) attending to individual and community level discourse allows civic emergency management authorities to gauge community attitudes to hazard preparation, and whether formal strategies are addressing specific community needs.

Table 17.
Participant Quotes Relating to Consequences (Discussing Issues, Thinking About Issues & Salience) of the Hierarchical Value Maps

	Consequences		
	Discussing issues	**Thinking about issues**	**Salience**
Napier	So as soon as it is covered at school it always comes up at home and they say, you know, "we know what's going to happen here because you drive us nuts with it" (Heather). Well there's only the wife and I here now but, you know, we have talked about it…and every so often she'll say isn't it time you changed the water and that was about it (Matthew).	I'm sort of aware of the positions of various heavy objects and aware also generally of the safest places within the house (Alan). The last thing you think about, but it's something you think about on a daily basis, you know (Joanne).	Often, you get quite complacent and you don't think unless someone actually points it out to you and makes you aware of what, what, you know, what can actually happen in a situation like that (Heather). It's in the back of your mind but it's not, you know, it's not "oh my god I've got to make sure the house is earthquake safe" (Joanne).
Benalla	It's always good to talk to people that have lived through those sorts of situations and, you know, we learnt a hell of a lot about it [1993 flood] (Kevin). I can't stop talking to people who don't understand [about flood consequences] (Margaret).	So you get that feeling when it just rains and rains and rains and rains that it's gotta go somewhere…and I had the feeling that night [1993 flood] that things weren't good (Chris). Well it's, after being flooded you're more aware of what could happen (Joan).	But of course we haven't had the rains since Easter, maybe if we had a lot of rain perhaps they might start talking about it when the rivers get up, which they're pretty low at the moment. While there's a drought they don't talk about it (Joan). In summertime often people will talk about bushfires and stuff like that but in winter time it doesn't seem to come up. Since I've been here in this area there hasn't been any threat of flood either but had it been, had I been living here when the flood actually come through maybe then it would have been more relevant (Julia).
Invermay	I like to talk about issues I suppose, yeah, something different to talk about with the kids (Cara). I do discuss it, I joke about it, I've definitely made a joke of it which, yeah, is one way of coping with it but at the end of the day, you know, it's not a joking matter really (Jenny).	I suppose that's mainly the only thing I've really thought about, possessions and where would I take them if I had the time to do that (Carol). Look, I'm just using my common sense and what I've seen and what I've heard over the last 7 years with the weather and everything in Tasmania (Kate).	I think it helps as in keeping it up in your mind because you can learn, read something in the paper and forget it and never recall it again but if you're talking things over you're more likely to remember them I think (Cara). Like I said most people might make a joke about it or see a bad flood somewhere else in Australia, you might think one day that might happen here, that might be us. I think basically other people have got other things on their minds (Carol).

5.3.2 Physical protection

An important consequence of previous experiences, and awareness of potential threats, was having a sense of physical protection. Napier residents indicated that it was important that their dwellings were of a solid enough construction to withstand the effects of earthquakes. For residents of Napier a sense of physical protection also arose from active preparing. This is an important part of earthquake preparing as it can provide shelter from the effects of earthquakes. While it is important to ensure the structural integrity of households against the effects of earthquakes the contents of buildings are also at risk in the event of an earthquake (Lindell & Prater, 2003). During an earthquake unsecured items within a house can act as missiles, potentially causing severe injury.

For residents of both Benalla and Invermay physical protection was influenced by hazard awareness. People are aware of the susceptibility of their immediate locations to flooding and whether their households were at physical risk of flooding. This was based on geographical knowledge of the area obtained via discussion with long term residents or accessing hydrographical information from local councils. Benalla residents' belief in physical protection was further enhanced by their experiences in the 1993 floods.

While having a sense of physical protection is an important aspect of preparing it can have the unintended consequence of individuals not actively engaging in preparation activities. This was the case for residents in flood affected areas. The quotes for physical protection in Table 18 illustrate that for people living in flood affected the belief that households were on high ground and/or outside the flood zone

precluded any further preparation. While households located on elevated ground can avoid the effects of direct flooding people are not anticipating the indirect consequences of flooding such being isolated by surrounding floodwater and cut off from emergency services and infrastructure.

5.3.3 Factors influencing non-preparedness

Table 18 illustrate that a factor in people not preparing for natural hazards, or not rate the importance of natural hazard issues highly was a perceived lack of motivation. Other elements identified in the Means-Chain analysis that reflected a reticence on the part of the interviewees in preparing or thinking about preparing were ‘Uncertainty’, ‘Reticence in Talking’, ‘Reticence’ and ‘Unprepared’. The hierarchical value models (Figures 8, 9 & 10) demonstrate that the common element underpinning these factors was ‘Salience’ (Table 18 provides examples of peoples reasoning behind a lack of preparation). Given that these consequences associated with a lack of preparing stem from an attribute (salience) indicates that decisions to prepare or not to prepare are arrived at the beginning of the thought process.

One of the reasons advanced by interviewees regarding a lack of preparation was inconvenience. A resident of Napier complained about the amount of materials required for adequate preparation and the lack of household space to store it. The respondent went on to point out that having these materials would only be effective if she was at home in the event of an earthquake. This is indicative of residents engaging in cost benefit analyses. As explained in Section 2.2.1 – Evidence for the utility of the social cognitive approach, people base decisions on performing certain

behaviours based on the associated costs and benefits. In this instance the interviewee has decided that the effort and inconvenience of preparing outweighs any perceived benefits. Other reasons advanced for a lack of preparation were the cost associated with preparing, health issues (respondents were not physically capable of performing some of the activities required) and whether residents were renting their household.

One reason for this is that people are judging the worth of preparing by its affect quality. That is, people are making their decisions based on the positive or negative feelings they are associating with preparedness behaviours (Slovic & Peters, 2006; Visschers & Siegrist, 2008). According to Slovic and Peters affect is a heuristic that people use as an efficient and swift way to arrive at a decision when faced with complex issues. One way to use this as a strategy to promote preparation activities is to advocate the benefits that are associated with preparing. As Slovic and Peters suggest this can work to decrease the perceptions of risk associated with the hazard while increasing the positive affect of preparation behaviours.

Table 18.
Participant Quotes relating to Non-Preparedness Factors (Physical Protection, Lack of Motivation & Salience) in the Hierarchical Value Maps

	Non-Preparedness		
	Physical protection	**Lack of motivation**	**Salience**
Napier		Slackness to be perfectly honest, that would be the major reason (Claire). No, it's more laziness of my behalf. I wouldn't blame them. Information is probably available if you went to seek it (Joanne).	So you cut the grass you see the benefits straight away, nice and tidy. If I go for a swim or go to the gym the immediate benefit to me is that I feel better inside myself. But Civil Defence it was virtually be preparing for earthquakes, you'd do a thing and you thought well I won't do it today I'll do it tomorrow sort of thing. And there's no urgency with it… But the earthquake could come in an hour's time or it could be in three years time. (Darren).
Benalla	The house now, well we were in the throes then of, we'd bought a block and we've built a new house and it's a foot above the absolute height of the last flood level so we're well prepared (Darryl). Yeah, I knew the floods had been through this area where I am. But the block I'm on wasn't flooded and it's still been built up a bit high so unless we get higher flood waters again I shouldn't get flooded, hopefully (Joan).	Well I'm not concerned because I don't think it will happen, that's the reason (Darryl). I think it's a matter of people sort of become conditioned "oh, it's not going to happen to me" (Peter).	So it would need to be a big flood to affect us… [preparing is] not very important (Chris). I know after the '52 fires when we were burnt a lot of effort went into what to do and people said oh yes, and they got busy but after a few years people forgot about doing those various things, what they should do to protect their homes (Peter). People forget about it 'til it happens and there's nothing the average person can do about it, you know (Roger).
Invermay	Well I suppose I've got a bit of a false feeling of security where I am in Invermay because I'm actually on the highest point of Invermay and in the '29 floods the house didn't flood or anything so in a way I suppose I've got that in the back of my mind, I'm in the best part of Invermay if it does flood but, you know, that's not going to necessarily be true, you know, just because the '29 flood didn't flood here doesn't mean that it won't happen (Cara).	To be honest I don't know. I've not really thought about it…pretty much. I just haven't really thought about preparing or if it does come through, you know, what will happen (Paul).	I guess self preservation sort of kicks in but, no it hasn't really crossed, unfortunately it hasn't really crossed my mind like it's something I've thought about but, you know, to prepare for or, you know (Paul). So that's what I've done, I've had a look to see how I might be affected. But, um, no, it hasn't been enough of an emergency yet for me to do too much (Wayne).

5.3.4 Shelter/self-sustaining/survival

As previously mentioned the sense of physical protection afforded by an appropriately prepared household was important for people living in areas at risk of earthquakes. However, Napier residents indicated that they wanted more than just ensuring their dwellings could withstand earthquakes. They also wanted to believe that the structural integrity of their household was such that they and their families would be protected.

Concurrent with the belief that they were sheltered, Napier residents also indicated that engaging in preparation activities allowed them to be self sustaining. Many of the Napier interviewees were aware that in the event of a major earthquake event they may be without outside assistance for a few days. This fact motivated several people to initiate preparedness activities. Lindell and Whitney (2000) presented evidence that people living in earthquake affected areas are heeding information that civic emergency authorities may take up to 72 hours to provide meaningful assistance. Lindell and Whitney found that residents in an earthquake affected area rated preparedness activities as being their responsibility, rather than significant others or, indeed, civic emergency management authorities.

As Figure 8 shows having the ability to be self sustaining stemmed from actively preparing households. In all six Napier interviewees indicated that engaging in specific preparation activities (i.e. having adequate supplies of bottled water and canned food, battery operated lights, gas operated stoves) allowed people to believe that they would be able to survive the aftermath of an earthquake. The element of ‘Survival’ represents an end point of a reasoning chain. It is a goal that people value

with respect to the adoption of hazard preparation activities. Table 19 demonstrates how people differential between these the elements of 'Self Sustaining' and 'Survival'. Self sustaining reflects peoples' understanding that help may not be immediately forthcoming following a major earthquake. Once people believe they can be self sustaining until help arrives they then believe that they and significant others can survive. That is, they can recover from the consequences of a major earthquake and return to a normal way of life.

Table 19.

Participant Quotes from Napier Interviewees Relating to Expectations of Preparing (Survival & Self-Sustaining).

Survival	Self Sustaining
Make sure that everything has got an equal chance of survival (Joanne)	Just to survive for, well at least for two or three days (Emily)
And I'm confident in myself that I will bloody survive this whatever, me and mine will survive and me neighbours and anybody I bloody know because, and its selfishness but you need that little bit of selfishness (James).	Having the ability to look after yourself for three or four days (Michael).
Well, water can be cut off sometimes just naturally. And, you can survive for quite a while just on water, food is not so important but water is pretty important, and I just had the need to put in water (Darren)	Well, because I know that you're not necessarily can be reliant, absolute rely on authorities come to your aid (Claire).
At least whoever's in our house has a chance, well in our neighbourhood has a chance (Emily).	And I think there are certain things that the individual can do to protect themselves, to ensure that they can sustain themselves post earthquake, just try to adopt those measures (Alan).
We'd still be able to survive in some form, you know one form or another (Heather).	Because we're about 20-30 minutes out of town and those little bridges we drive over, if they were out we'd be awhile, it'd be 2 days before they got to us, if at all, so I mean you've got to have something in place (Heather).

The data presented here indicates that the attributes that people make in regards to natural hazard preparation can result in positive or negative consequences. It is the salience and relevance that people attach to natural hazard issues that can influence hazard cognitions. The fact that attributes (according to Means-End Chain theory the lowest level of the cognitive process) are influencing cognitions relating to preparing or not preparing indicates that these decisions are made early in the cognitive process.

While this conclusion needs to be tempered with the knowledge that the present study is of a cross sectional nature (i.e. data is captured at one point in time) it suggests that future versions of the Social Predictor Model of Intentions to Prepare (Paton, 2006) includes measures that account for salience and relevance. These issues will be discusses further in Chapter 6. The data also shows that the links between the attributes that people assign to natural hazard preparation and the goals they wish to achieve are embedded in the interactions between individuals, and between individuals and the community. The identification of the mediating elements of 'Discussing Issues' and 'Community Involvement' indicate that the expectations that people attach to preparedness issues arise through interactions with others.

5.4 Values

Values represent the end point of the hierarchy as theorised by means end chain theory, the goals that individuals desire. Means end chain theory argues for a link between the actions that people perform and the goals that are desired (Mort & Rose, 2004; Gutman, 1982). The models show that the goals that people wish to attain are

not decided by the individuals themselves but are as a result of interaction with the surrounding environment. Through both involvement in the community and discussion of natural hazard issues participants were able to achieve that which they valued.

As previously discussed (Chapter 4) the values that were common to earthquake and flood affected areas was a responsibility to others and peace of mind. How this peace of mind was achieved was unique for the different areas. For Napier and Invermay residents protection of themselves and family was an important aspect of attaining peace of mind while Benalla respondents indicated that the protection of possessions was a necessary part of reducing the uncertainty associated with natural hazard preparation.

5.4.1 Protection

For Napier and Invermay residents an important outcome of natural hazard preparing was that their families were protected from the consequences of earthquakes and other natural hazards. The importance of ensuring that families are protected was demonstrated by Darren. For many years Darren had volunteered with Civil Defence. Darren made the point that as far as he was concerned there would be no choice between fulfilling his civil defence duties and protecting his family.

> *"Years ago I was involved in civil defence and someone said to me 'if there was an earthquake you'd go straight to your centre' and I said 'no, if there was an earthquake I'd go home first' because I'd never be useful in managing an earthquake scene if I don't know if my family is safe. So my first priority*

is my family, they're okay then I can focus on my work after that" (Darren – Napier).

This is an indication of the personal responsibility that Napier and Invermay residents felt towards preparation. The issue of responsibility in the adoption of natural hazard mitigation activities is an important one. Lindell and Whitney (2000) have found that individuals residing in areas at risk of earthquakes who perceive preparation as being their personal responsibility are more likely to adopt natural hazard protective measures. Perry and Lindell (2008) have reported similar findings for individuals living in earthquake, volcanic and bushfire affected areas.

The finding that personal responsibility influences hazard preparedness decisions conceptually supports other social cognitive models such as the Theory of Planned Behavior (Ajzen, 1991) and the Health Action Process Approach (Schwarzer & Renner, 2000). These models identify higher levels of personal responsibility and self efficacy as influencing the adoption hazard mitigation behaviours (Perry & Lindell, 2008). This was also an important finding in the Social Predictor Model of Intentions to Prepare (Paton, 2006) as positive outcome expectancies were a predictor of intentions to prepare for natural hazards.

Table 20.

Participant Quotes relating to Values (Protection & Protection of Possessions) of the Hierarchical Value Maps.

	Protection	Protection of possessions
Napier	So if we did have an earthquake then straight away you look after your own family (Heather). I have a responsibility to my partner, and my children when they're here, to look after them as best I can (Michael). I mean it's a sort of insuring that your own family's safe, your children are somewhere safe (James).	I want to be with my possessions. I don't want to run away from it and someone else will pinch it (Lisa). You'd want to be able to grab you're photos and that sort of stuff, don't you (Tanya).
Benalla	That's about all I can think of, just mainly, you know, for, just doing everything that you can to protect your own, protect where you are (Julia).	Well you need to keep them, historical things, family things, heirloom things, records, you know, things that can't be replaced photos, things like that, important to families that can't be replaced (Karen). …and make sure, of course, that you haven't left anything behind that you want to keep like photographs of family and money and bank books and that sort of thing and enough clothes to do you (Margaret).
Invermay	I think at the end of the day you're got to be a bit… philosophical about it in that…if it's going to happen then just protecting your own life is the most important thing and all that other stuff is just, you know, material (Jenny). I'd like to know that I can do what I have to do to protect my kids I suppose, yeah, number one for me (Cara).	So, like I said, the house is important to me but not as important as getting a few of my possessions (Carol). You've got to think of all your possessions, I mean they're not important in an emergency but still you know, like you spend a lifetime collecting them (Cara).

5.4.2 Protection of possessions

For the residents of Benalla protection of personal possessions was a major expectation connected with natural hazard preparation. However, this is not as materialistic as it sounds. Benalla respondents indicated that it was important to protect possessions as it helps to define who the person is as an individual.

Possessions can provide a powerful symbol of status and individuality. In a natural hazard situation the normal stream of self identity information is interrupted and replaced by ambiguous information regarding self identity (Silberbauer, 2003). Protecting one's possessions is an important component in the ability to quickly return to a normal way of life. Severe natural hazards can cause profound disruptions to normal everyday life, physical, emotional and social life (Gordon, 2004). The ability to quickly overcome the effects of natural hazards and return to a normal way of life can assist people in coping with the upheavals associated with the consequences of natural hazards. The following quote highlights the importance of possessions in maintaining a sense of self.

> *"I'm 47 and I still go back to the photos of when I was at school and think about those days and my kids drag out the videos and photos etc. and they're the things that are important to them, the memories, so a lot of those things just are irreplaceable. You can go down and buy another mower, you can buy another stove or a fridge but you can't buy those photos back." (Kevin - Benalla).*

5.5 Summary

The Hierarchical Value Maps (Figures 8, 9 & 10) provide addition new information to the argument that the social context (e.g., the social relationships

between family, friends, other members of the community, civic emergency agencies) is an important influence on how people make decisions regarding the adoption of protective measures. This was demonstrated at the level of attributes. For all three locations active preparing was considered an important attribute of preparing.

However, the majority of attributes were abstract in nature. This indicates that while the physical aspects of preparing are important the context and environment that these decisions are made in are equally important. The findings of these cognitive maps share important similarities with that of those of the Social Predictor Model of Intentions to Prepare (Paton, 2006). The element of 'Belief in Preparing' is reflective of positive outcome expectancy. 'Inconvenience', while reflective of negative outcome expectancies, may also indicate an unwillingness to prepare even though the individual may have positive expectancies. As discussed previously (Section 2.2.1 Evidence for the utility of the social cognitive approach & Section 5.3.3 Factors influencing non-preparedness) cost-benefit analyses play an important role in decisions regarding the performance of specific behaviours. While individuals may accept that preparing can help to minimise the consequences of natural hazards the short term costs associated with preparing may preclude people from considering the long term benefits of preparing.

'Influence of Others' and 'Shared Experiences' are representative of the community participation variable. The elements 'Relevance' and 'Source of Information' reflect the empowerment and empowerment-trust variable. These convergent sources of data provide support for the continued use of social cognitive models in natural hazard research. They also support the further examination of these variables in both a quantitative and qualitative context.

The key attributes highlighted in this analysis suggest that if hazard mitigation programs are incompatible with these beliefs the likelihood of people attending these programs is low. The Hierarchical Value Maps have also provided new directions for the further development of the Social Predictor Model of Intentions to Prepare (Paton, 2006). Of particular interest to future research are the elements of 'salience' and 'relevance'. The role of salience in hazard decision making indicates the need for civic emergency agencies to consider other life demands (some of which can be highly idiosyncratic) when formulating strategies directed at assisting people to manage their hazard risk.

This is consistent with the goal of the Social Predictor Model to Prepare (Paton, 2006) to account for influence of general day to day experiences in the formation of intentions to prepare. The finding that relevance plays an important part in hazard decisions indicates a further connection with the model. That is, the need to ensure that hazard mitigation programs provides information that people need to know, and recognising that perceptions of information relevance can differ from individual to civic emergency agencies.

The 'consequences' level of the HVM further indicates that the cognitive maps are tapping into similar variables as the Social Predictor Model of Intentions to Prepare (Paton, 2006). The HVM go further, however, by showing what specific consequences people are associating with the attributes of natural hazard preparing. 'Unprepared' and 'Reticence' reflect processes that reduce the likelihood of not preparing. 'Community Involvement' and 'Discussing Issues' mirror the role of community participation and articulating problems in the model.

Consistent with Means-End Chain Theory (Gutman, 1982; 1997) the cognitive maps show that relationships between attributes and consequences can be either positive or negative. An important finding of the qualitative data was that a large number of these evaluations derived from single attributes, predominately 'Relevance' and 'Salience'. The importance of the former in relation to trust and distrust decisions was previously discussed in Chapter 4. Taken together these findings support the inclusion of these elements in future versions of the model to assess those everyday experiences through which people construct their understanding of natural hazard issues.

The level of values represents those goals that people desire and indicate the end point of the reasoning chain. This represents an important implication for the natural hazard literature as it pinpoints what outcomes people are expecting when considering natural hazard preparation. As theorised by Means-End Chain Theory the values that people desire invest consequences and associated actions with positive or negative evaluations. In other words, behaviours are more likely to be repeated if it results in desired outcomes (Gutman, 1982; 1997). For instances, as a consequence of discussing hazard issues and community involvement a sense of responsibility to others is likely to be engendered. As this is a desired outcome the discussion of hazard issues and involvement in community issues is more likely to be repeated.

The data presented here indicates that those hazard preparation outcomes that people values are socially constructed. For flood locations the values of 'protection', 'responsibility to others', 'peace of mind' and 'protection of possessions' were obtained through the discussion of hazard issues and involvement in community activities. The Napier data showed that attainment of the value of 'responsibility to

others' also arose through discussion of earthquake issues. What this indicates is that values provide an indication of the attitudes of people to natural hazard preparation.

Chapter Six

6.1 General discussion

The findings of the present study have demonstrated that elements of the social environment in which people live and work (i.e., family, neighbours, community organisations, social networks, workplace) play a significant role in accounting for differences in the level of intentions to prepare for earthquake and floods. The quantitative component of the present study (Figures 3 & 6 Chapter 3) provided evidence that in times of uncertainty people will utilise those community capacities (i.e. community participation) that reflect their everyday experiences. This was confirmed by the qualitative data with the element of 'Community Involvement' being identified as an mediating influence between the attributes that people attach to hazard preparation and the goals that people wish to attain (Tables 11, 12 & 13; Figures 8, 9 & 10).

The quantitative and qualitative components also provided important information regarding the relationships between community members, and between communities and civic emergency management agencies. The qualitative data revealed the unexpected finding that the responsibility that people felt towards the welfare of others is a motivating factor in adopting preparedness measures. If this is representative of an ongoing general community characteristic it provides a new research avenue to pursue in relation to the effective dissemination of hazard preparation information. This finding will be discussed shortly.

Both the quantitative and qualitative components confirmed the importance of the relationship between communities and civic emergency management agencies in reducing the uncertainty associated with natural hazard events. The Social Predictor

Model of Intentions to Prepare (Paton, 2006) (Figures 3 & 6, Chapter 3) confirmed the mediating role of trust between community processes and authorities in both earthquake and flood affected areas.

The qualitative component expanded on this with the unhypothesied finding that people make separate trust and/or distrust decisions based on the relevance that is attached to hazard preparedness information. This finding that is one that has not been previously reported in the natural hazard literature and provides an important new direction for research into the relationship between communities and civic emergency management authorities. The unexpected findings of the motivating role of responsibility to others and the trust/distrust distinction important will now be discussed in relation to how these findings add to the hazard literature and implications for future research.

6.1.1 The distinction between trust and distrust

A major finding of the qualitative component of the present study was the distinction that people made between trust and distrust of civic emergency management authorities. This stemmed from the relevance that people attached to hazard information. People were influenced to trust authorities if the hazard preparedness information was perceived to be relevant to their needs. Conversely, if the information was perceived to be irrelevant (i.e. did not address their specific needs) people were likely to distrust authorities.

The Hierarchical Value Models presented in Chapter 5 show that for all locations (Figures 8, 9 & 10) relevance is an attribute. According to Means-End Chain theory (the methodological basis for the qualitative study) attributes represent

the lowest level of reasoning process. They are the initial evaluations that people make with regard to a behaviour, from which are derived consequences (i.e. trust, distrust) (Reynolds & Gutman, 1988). This suggests that the distinction between trust and distrust is made at the beginning of the reasoning process, indicating that these elements are the result of separate reasoning processes.

The finding that decisions regarding the trust or distrust that people have in civic emergency management agencies could be representative of separate reasoning processes is one that has not been previously noted within the natural hazard research, thus making this finding an important addition to the literature. Within the natural hazard literature trust has been found to play a crucial mediating role between communities and civic emergency management agencies (e.g. Briggs & Stern, 2007; Paton, 2006; Vogt et al., 2005).

What these studies have found is that the quality of the relationships between communities and emergency management authorities (as measured by the level of trust) is a major component in people's intentions to prepare for natural hazards. Paton et al. (2009) found in areas at risk of tsunamis that increased levels of trust in civic emergency management agencies made it more likely that people would attend to and use the provided information to prepare themselves and their households against the consequences of tsunamis.

However, these studies assessed trust only. While distrust was found it was as a consequence of a reduction in trust. This stemmed from these studies using a single measure of trust. The data of the present study indicates that separate measures addressing trust and distrust could be necessary in future uses of the Social Predictor

Model of Intentions to Prepare (Paton, 2006) to provide a more complete picture of trust issues.

Sjöberg and Herber (2008) have questioned the reliance on social trust (i.e. trust in people, agencies or institutions) alone in explaining people's perceptions of risk. Sjöberg and Herber argue that relationships between perceived risk, attitudes and social trust in authorities have been shown to be weak, and contend that other dimensions of trust need to considered. Sjöberg and Herber found that epistemic trust (trust in the underlying scientific basis of technology) to be a more important determinant of perceived risk than social trust. Using this dimension of trust it is argued that people who are concerned about a hazard issue will apply a more rigorous testing of the content of the information received from relevant authorities before making any trust decisions.

As discussed in the previous chapter (Section 5.2.9 - Early Warning) having trust in technology can have detrimental effects on preparing. The technology associated with flood early warning systems can help in easing people's concerns regarding flood issues. However, it can lower concern to such an extent that people transfer their responsibility for preparing to others (i.e. local flood management authorities, scientific institutions) and no longer consider personal preparation as necessary.

While epistemic trust is akin to a measure of distrust, Sjöberg and Herber (2008) place this dimension within the total picture of trust. In other words, trust and distrust are conceptualised as lying on a continuum. The present study is arguing that they may constitute separate constructs and future work on trust should include separate measures of trust and distrust.

The finding that trust and distrust reasoning processes may be of a discrete nature has important implications for hazard communications. It would necessitate separate communication strategies to account for these distinct reasoning processes. Civic emergency management authorities would need to address perceptions of distrust, not just low levels of trust, between them and community members before they could present hazard information. The finding that it is the perceived relevance of hazard information that can determine the levels of trust and distrust between authorities and community members suggests that emergency management authorities should attend to the context within which hazard information is received and utilised by members of the community (Kumagai et al., 2004; Lion et al., 2002). Even though the information provided by the relevant authorities is correct, if it is not perceived by community members as addressing specific concerns then it may be dismissed as not being relevant.

One possible explanation for this finding is that people are basing their perceptions of relevance on prior attitudes regarding the hazard rather than official information. This parallels the associationist model of trust (Eiser, Miles, & Frewer, 2002). In this model trust and perceived risk are seen as consequences of a general underlying attitude to a hazard. In other words, it is general evaluations of the acceptability of a risk that underpins trust decisions and perceived risk rather than specific instances (i.e. information provided by civic emergency management authorities). This was demonstrated in the hierarchical values maps (Figures 8, 9 & 10 Chapter 5).

General awareness of the consequences of natural hazards and prior experiences were a major influence on whether individuals intended to prepare or not prepare.

This has implications for hazard communication. Individuals may be viewing hazard preparation information through the filter of pre-existing attitudes. Before engaging in information campaigns it may be necessary for civic emergency management authorities to establish how people make positive and/or negative evaluations of hazards.

As discussed in Chapter 4 Schul et al. (2004) have advanced the contention that trust and distrust could be reflective of separate reasoning processes. If the relationship between communities and authorities is nested within a trusting environment then people will only need to focus on the information itself. However, if a relationship of distrust exists then a different cognitive process is required. The information is temporarily discounted and people then focus on the processes of the information source. In effect, they are assessing the veracity of the source. Schul et al. warn that if an environment of distrust exists between the massage source and the message recipient it can influence the non-acceptance of information that is not connected to the original reasons for the distrust. This has implications for the delivery of hazard mitigation programs.

The information that is provided by authorities may be correct but individuals need to believe that it addresses their specific concerns (Smith et al., 2001). If individuals perceive that the provided information is not relevant then it could be ignored and, more importantly, result in community members rejecting the information. This rejection can be based in part on the content of the information but also because of pre-existing perceptions of distrust in the source. It is this discrepancy between what authorities believe that the public needs to know and what the public

wants to know that can produce distrust and make seemingly balanced information appear irrelevant (Frewer et al., 2003).

The finding of the present study that people distinguish between trust and distrust of civic emergency management agencies provides further evidence that relationships between individuals and emergency management authorities are interdependent ones. This reiterates the platform on which the Social Predictor Model of Intentions to Prepare (Paton, 2006) was developed. The model argues that the level of community resilience to natural hazards can be assessed by the quality of the relationships between the community and hazard management agencies. In other words, the model is arguing that for people to independently plan and carry out preparation measures they not only need to feel empowered, but they need to believe they are operating within an empowering setting. These twin elements of empowerment are vital.

The involvement of people in the process is important but it will not guarantee empowerment. The surrounding social environment is crucial to the full development of empowerment (Baillie et al., 2004). For hazard preparation strategies to be effective people must be able to formulate and articulate their needs, and be satisfied that the responses, information and resources they receive from civic emergency management agencies are addressing their needs.

As the distinction between trust and distrust was not anticipated in the original model future iterations need to accommodate these constructs by incorporating separate trust and distrust variables. This could necessitate expending the empowerment variable within the Social Predictor Model of Intentions to Prepare (Paton, 2006) to include reference to the relevance of information. As it stands the

measure of empowerment used in the model is tapping into people's perceptions of operating within an empowering setting. That is, the extent people believe that their relationships with the community and with civic emergency management authorities enable them to achieve positive outcomes. This measure could include assessments of the quality of the information received from emergency management agencies. From this amended measure of empowerment two pathways would lead to the separate measures of trust and distrust.

6.1.2 Responsibility to others

The identification of the motivating influence of values is an important addition to the research on the influences of intentions to prepare for natural hazards. One of the main findings, and an unexpected one, was the motivating role of the responsibility that individuals felt towards the wellbeing of others. Participants indicated that not only was their own personal safety important but that ensuring that other community members were safe was also an important motivating factor in preparedness decisions. This manifested itself in either helping others in the aftermath of a natural hazard event, or in providing information on preventative measures. Individuals felt that it was an obligation on their part to render assistance to others.

An important point to make in regards to this finding is the timing of the interviews from which this data derived. These interviews were conducted at time of hazard quietude. Napier interviewees had not been subjected to any recent seismic activity and the interviews for Benalla and Invermay were conducted before the traditional onset of the flood season. Given that the element of 'Responsibility to Others' was a prominent value in the Hierarchical Value Maps (see Figures 8, 9 & 10

Chapter 5) suggests that this characteristic could be a part of everyday life for these communities. This is consistent with the Social Predictor Model of Intentions to Prepare (Paton, 2006). The model argues that the community capacities (i.e. social support networks, relationships with authorities) that people utilise in the face of natural hazard events are those that are in day to day usage.

While this finding needs further investigation to verify its influence it does suggest that tapping into pre-existing altruistic tendencies could assist in promoting the efficacy of protective measures. The threat posed by a major hazard event can make it more likely that people will engage in pro-social behaviours. However, Jonas et al. (2008) provided a caveat that a personal obligation to help others needs to be the prevailing community attitude. Aquino, Freeman, Reed, Lim and Felps (2009) have further argued that even people who are predisposed to attend to the welfare of others will have those behaviours eroded if the surrounding social environment is not conducive to pro-social activities. Thus, the concepts of empowerment and empowering contexts may apply also to intra-community processes. This suggests that hazard preparedness strategies could highlight how preparing can assist others in the community (i.e. children, elderly, neighbours etc.).

One possible explanation for the motivating role of responsibility to others is that people believe that it is the moral thing to do. As discussed in Chapter 4 (Section 4.3.1 – Individual Factors) having a personal sense of responsibility has been acknowledged as a motivating force not only in forming intentions to perform behaviours but also in actually performing that behaviour (Godin et al., 2005). Ellemers, Pagliaro, Barreto, Manuela and Leach (2008) have argued that moral judgements are an important determinant of people's evaluation of the groups they

belong to. It is important for people to be seen by others as being moral. Ellemers et al. found that these judgements of morality held more weight for people than judgements of competence. In other words, judgements of morality (i.e. acting in a manner beneficial to others) were more of a motivating factor in adjusting behaviour to reflect group norms than perceptions of individual or group behavioural competence. This suggests that hazard mitigation programs need to present preparation activities as a community wide initiative, rather than a purely individual activity. By framing preparation in terms of responsibility to the community, and being seen as being responsible, hazard preparation programs can tap into pre-existing moral norms.

The finding that a sense of responsibility to others is a motivating factor in preparedness decisions provides evidence that community outreach programs should focus on making people more responsible for their preparing. In effect this would put the onus on individuals rather than leaving it to the authorities. Programs directed at giving community members responsibility for their preparation have been implemented in flood affected areas (e.g. Gissing et al., 2007) and in earthquake affected areas (e.g. Karanci et al., 2005). These programs have met with varying degrees of success with the acknowledgement that issues pertaining to preparing need to be salient. The common point highlighted in these studies was the commitment for both community members and authorities needs to be ongoing. Notwithstanding this, giving people more of a sense of ownership of their preparation helps to foster co-operative behaviours between individuals and authorities through encouraging a sense of inclusiveness among individuals (DeCremer et al., 2005).

6.1.3 Implications of the present study

The findings of the present study have provided important new insights into the relationships between communities and civic emergency management agencies in relation to preparing for natural hazards. This in turn has implications for the development and delivery of hazard mitigation programs. It argues for civic emergency agencies to work more closely with at risk communities to understand unique community characteristics that can impact on hazard preparation. Murphy (2007) has argued that familiarity of community relationships can work to the advantage of civic emergency agencies. Hazard management authorities can use these existing relationships to quickly disseminate hazard information and to efficiently communicate important information to multiple groups.

The findings of the present study point to specific aspects of the social environment that can assist future hazard mitigation programs in promoting hazard preparedness measures. The major finding of the present study, that trust and distrust may represent distinct constructs has important implications for the delivery of hazard preparedness information. The suggestion that trust and distrust could reflect the outcome of discrete reasoning processes necessitates the development of a two stage strategy to deliver preparedness information.

The first stage would need to counter people's perception of distrust. This would encompass civic emergency agencies addressing the specific needs of the community regarding preparing. Concurrently, civic emergency agencies need to facilitate community understanding of the information, how to access it, how to use it and how the verbalise additional requirements. The second stage involves the interactions between people and civic emergency agencies that promote an

environment of trust, with people articulating their needs and receiving answers that satisfy these needs.

The finding that people considered their responsibility to the welfare of others a motivating factor for preparing has important implications for the delivery of hazard mitigation programs. As discussed earlier the fact that the present study was conducted at a time of hazard quietude suggests that a responsibility to the welfare of others is a pre-existing community characteristic. If it is the case that this characteristic is present in the community then hazard outreach programs could couch preparation information in moral terms (helping immediate family members, neighbours, elderly, children etc.). Adopting this method can help civic emergency managers in motivating people to view individual household preparation as part of a community wide approach to preparing for natural hazards. Highlighting the community benefits that can result from individual preparation activities can help to build community level resilience to the consequences of natural hazards.

The findings of the present study argue for civic emergency management agencies to work more closely with at-risk communities to understand unique community characteristics that can impact on hazard preparation. The present study's identification of pre-existing community characteristics such as the distinction between trust and distrust, responsibility to others and previous experience and hazard knowledge influencing levels salience argues for a shift from the traditional top-down, information dissemination processes to a more bottom up approach from hazard outreach programs.

As sustained hazard preparation evolves over a prolonged period successful community commitment requires hazard mitigation programs to be largely

community driven (O'Neill, 2004). Jonientz-Trisler et al. (2005) reported on initiatives of federal, state and local government agencies to better prepare North American communities against the consequences of tsunamis. These measures included the erection of signs (indicating tsunami hazard areas and evacuation routes), pamphlets (showing tsunami hazard maps and evacuation routes) and the production of educational materials for both communities in general and schools in particular.

While it is important to provide specific information regarding the hazard and how prepare it is equally important to attend to the processes that people use to assign meaning to this information. The present study has provided important insights into this process. The Hierarchical Value Maps (Figures 8, 9 & 10 Chapter 5) demonstrated that previous experience and knowledge of a hazard can influence the salience that a person attaches to natural hazard issues, which in turn can influence the positive or negative evaluations that people make regarding preparation.

Previous work in natural hazard areas has focussed on the benefits of co-operation between communities and civic emergency management agencies. As reviewed in Chapter 3 (Section 3.5.4 Community Participation and Articulating Problems) Gissing et al. (2007) reported on the joint efforts of a flood affect community and local emergency management agencies to produce a flood emergency management plan. It was hoped that giving community members' ownership of their preparation would entail the plan reflecting community behaviours. Similarly, Shaw, Gupta and Sarna (2003) reported on an intervention program conducted in a community following the devastating 2001 Gujarat earthquake in India. This was a three stage program that initially focused on restoring the community to a normal

way of life. Following this it focused on those community capacities (training of builders, carpenters etc., social relationships, cultural factors) that could be developed to allow the community to be self sustaining.

Both Gissing et al. (2007) and Shaw et al. (2003) highlight the benefits of integrating civic emergency management and community projects designed to develop and sustain community natural hazard resilience. These studies demonstrated the importance of incorporating previous experiences of natural hazards into the development of community emergency management plans. The qualitative component of the present study also demonstrated the motivating influence of previous experiences, particularly for residents of Benalla (see Figure 9 Chapter 5).

The findings of the present study have also provided new avenues of research regarding the utilisation of existing community competencies in the development of resilient communities. The inference that responsibility to others could be a characteristic inherent in the surveyed communities has important implications for future co-operative efforts between civic emergency management agencies and communities. While it is important to integrate those experiences unique to natural hazards into emergency management plans the present study has identified important community characteristics that are reflective of general everyday experiences (i.e. relationships based on trust or distrust between communities and authorities) that people commonly draw on when dealing with the uncertainty associated with natural hazards.

6.1.4 Future research

The findings of the present research highlight the need of civic emergency managers to engage with communities at risk of natural hazards and promote a sense of ownership of community preparation. Natural hazard preparation is best performed in times of hazard quietude (e.g. implementing flood preparation in summer months). The problem with this approach is one of salience. As was noted in interviews with residents of Benalla summer months were associated with a lack of rain and in some cases drought, conditions that are not conducive to thinking of flood preparation. This could be ameliorated by encouraging people to consider multiple reasons for flooding. By increasing the complexity of peoples causal models of flood causes can assist in keeping these issues current. If people are thinking and talking about flood issues the greater the likelihood they will have more positive attitudes to preparing (Whitney et al., 2004) (see Section 4.3.3 – Societal factors for further discussion).

Similarly, Napier residents indicated that the period of time since the last major earthquake (1931) reduced the salience attached to earthquake issues, resulting in other issues (i.e. family matters, health etc.) taking precedence. The hierarchical Value Maps (Figures 8, 9 & 10) presented in Chapter 5 demonstrated the key role of salience in influencing the extent that people thought about and discussed hazard issues. This finding suggests that future versions of the Social Predictor Model of Intentions to Prepare (Paton, 2006) should incorporate a measure of salience to assess the degree to which people are thinking about their preparation. This could also extend to assessing the relationship between salience and general involvement in the community. As previously discussed (Section 5.2.5 – relevance and salience) while people may perceive hazard preparation as important other life factors such as health,

crime etc. may be seen as having greater salience. This highlights the need for hazard mitigation strategies to consider hazard preparation in conjunction with other life demands.

It was for this reason that intentions were included in the model, to tap into individuals beliefs regarding the act of preparing. The quantitative component of the study found that existing community and societal relationships could explain 37% of the variance in intentions to prepare for earthquakes (see Figure 3 Chapter 3) and 20% of the variance in intentions to prepare for floods (see Figure 6 Chapter 3). This suggests that further work is needed to increase the level of variance that the model accounts for.

It could be necessary to include a complementary measure of intentions in future versions of the Social Predictor Model of Intentions to Prepare (Paton, 2006). The current measure of intentions to prepare implies the behaviours will be performed within in certain time frame (Ziegelmann, Lippke, Schwarzer, & Luszczynska, 2007). However, an important reason why natural hazards generate so much uncertainty is due to its unpredictability. While assessing beliefs in general outcomes is important it might be useful to incorporate a measure of intentions that focuses on specific details regarding preparing for future events. One approach that future research could focus on is implementation intentions (Gollwitzer, 1999).

At the core of implementation intentions are individuals anticipating what behaviours are required in a given situation. Behaviours are linked to certain environmental cues. It is only when the individual identifies these cues that the behaviour is initiated. As Gollwitzer (1999) points out this strategy reduces the cognitive resources needed and gives the behaviour a certain amount of automaticity.

The fact that implementation intentions are asking people to specify exactly when, where and how actions are to be performed is consistent with the Social Predictor Model of Intentions to Prepare (Paton, 2006) in that both approaches recognise the ability to articulate specific needs as a core component in preparing. Implementation intentions are secondary to overall intentions. Intentions are more general in that it links the individual to an overall outcome. Implementation intentions are more specific as it links a behaviour with a specific cue. In other words, implementation intentions provide initial motivation in attaining the overall goal by making preparation activities salient (Gollwitzer, 1999).

However, as Parks-Stamm, Gollwitzer, & Oettingen (2007) have pointed out, for implementation intentions to facilitate actual performance of an action the environmental cues that an individual uses to initiate a particular behaviour needs to be readily accessible. That is, cues need to be situated in an environment that people are familiar with. This corresponds to the main aim of the Social Predictor Model of Intentions to Prepare (Paton, 2006), identifying those common everyday experiences through which people interpret and act on natural hazard information and, importantly, how those experiences can be co-opted into hazard mitigation strategies. For example, one of the Napier interviewees used the beginning and end of daylight savings time as a cue to check smoke alarms and other battery operated equipment needed following a natural hazard event. Future versions of the model could assess the utility of implementation intentions by assessing its utility in mediating between community and societal relationships and intentions to prepare.

6.1.5 Limitations

A limitation of the present study was its cross sectional nature. Data was only collected at one point time. This meant that participants were being interviewed at varying stages of their reasoning process in regards to preparation. Interviewees were at the beginning middle or end of their reasoning process. In other words, the present study may have been assessing outcome expectancies in some participants while others had made their decision on the efficacy of preparing and had progressed to actual preparing.

An outcome of this could be that some of the variables identified could have been classified as attributes, consequences or values. To provide a more rigorous testing of the variables identified future research could utilise a longitudinal study. By testing at different points the long term influences of the variables of the Social Predictor Model of Intentions to Prepare (Paton, 2006) can be examined, and whether this influence changes over time. This would also assess the extent that feedback and discussion of issues that occurs between people can influence positive and/or negative evaluations of the efficacy of adopting protective measures. The addition of an intervention program could further assess societal influences on intentions to prepare by ensuring that the participants were at the beginning of their decision making and tested along a linear trajectory.

A further limitation, and one that is common to cross-sectional research, was in the small return rate or questionnaires for each the flood affected areas (Benalla, Invermay, Ingham, Longford). The highest return rate was 12.4% for Invermay. While the combined data was adequate for an overall flood SEM the small sample sizes preventing any comparisons between these four locations. This precluded any

further rigorous testing of the Social Predictor Model of Intentions to Prepare (Paton, 2006). It also prevents the present study from generalising too much to a wider population.

This raises issues of whether to sample drawn from these areas were representative. One area of concern is whether those people who did not participate share the same social motives. However, the data from both the quantitative and qualitative studies indicated that those people who are not predisposed to prepare were represented to a certain extent. This is one group that would not be expected to participate in such a study. The structural equation models for the earthquake (Figure 3 Chapter 3) and flood studies (Figure 6 Chapter 3) show a significant relationship between negative outcome expectancies and intentions to prepare. Given that this reflects those people who do not believe that hazard preparation activities will have any discernable effect indicates that people who are disinclined to prepare do participate in these types of studies.

The finding that people not disposed to preparing do respond to these studies supports other work in this area. Significant relationships between negative outcome expectancies and intentions to prepare have been found in areas at risk of bushfire (e.g. Paton, Burgelt et al., 2008) and earthquakes and floods (e.g. McIvor, Paton, & Johnston, 2009). Similarly, the qualitative component of the present study demonstrated that people disinclined to prepare are still willing to participate. The Hierarchical Value Maps for Napier, Benalla and Invermay (Figures 8, 9 & 10 Chapter 5) show that a consequence of not attaching a high level of salience to hazard issues was a low degree of motivation to talk about, and prepare for, natural hazards.

6.2 Conclusion

The findings of the present study have added considerably to the natural hazard literature. The qualitative component has provided important new information regarding the relationships between community members, and between communities and civic emergency management authorities. The distinction that people draw between trust and distrust of authorities argues for the re-examination of this relationship and its impact on the delivery of hazard mitigation information.

The finding that the responsibility that people felt towards the welfare of others is a desired outcome of preparing offers a fresh insight into factors that can motivate people in preparing for natural hazards. The quantitative component demonstrated that the Social Predictor Model of Intentions to Prepare (Paton, 2006) provides a means for assessing the degree to which general community and societal factors influence intentions to prepare for natural hazards. The finding that the model was applicable for earthquakes (Napier) and floods (Benalla & Invermay) identified those common everyday experiences that might be incorporated into hazard mitigation programs.

However, use of the model does not ignore the fact that each hazard, and each affected location, has unique characteristics. For instances, peace of mind and responsibility to others were common motivating factors for all locations. However, protection of possessions was a motivating factor unique to Benalla residents. In other words, these participants classified those activities that helped to facilitate a return to normal life following a natural hazard event as an important motivator for preparing. This necessitates hazard management outreach programs being tailored to meet each community's specific needs. This would require on-going engagement

between at risk communities and civic emergency agencies to understand the most effective way for community members to manage their risk.

The findings of the present study provide new insights regarding the community and societal processes that can influence the adoption of household protective measures. The finding that trust and distrust could reflect separate reasoning processes provides an important insight into the relationships between communities and authorities. It argues that trust and distrust may not be opposite ends of a continuum but represent conscious decisions that people make early in the reasoning process. The implication for hazard mitigation strategies is that effective public education involves more than the provision of information. It requires the establishment of a discourse between at risk communities and civic emergency management authorities. This would aid authorities in identifying the specific needs of the community. It would also assist community members in locating, assessing and effectively using available resources. In other words, a transparent relationship between communities and authorities would allow for the information provided to be seen by community members as being relevant.

To further facilitate understanding of community and institutional relationships future iterations of the Social Predictor Model of Intentions to Prepare (Paton, 2006) need to reflect the trust/distrust distinction. The contention that decisions of trust or distrust in emergency management authorities could reflect separate reasoning has wide ranging implications for the delivery of hazard mitigation information (i.e. the delivery of separate information streams that reflected trust and/or distrust people may have in emergency management authorities). This argues for further investigation of the origins of trust and distrust decisions.

The Hierarchical Value Maps for Napier, Benalla and Invermay (Figures 8, 9 & 10 Chapter 5) provided new insights into the reasoning processes that people employ regarding hazard preparation decisions. It confirmed that decisions related to preparing are not made isolation but result from relationships between people, their communities and emergency management authorities (i.e. the social environment). The maps showed that the attributes (physical preparedness activities and underlying perceptions of threat) that people connect with preparing result in either positive or negative consequences (either thinking and talking about hazard issues or not considering these issues). The maps demonstrated that the end result of this reasoning process is the values, or goals, that people attach to preparing. This provided important new information regarding reasons that underpin hazard preparation decisions.

The fact that the Hierarchical Value Maps demonstrated that the protection of family and attaining peace of mind were desired outcomes of preparing was not surprising. However, the finding that responsibility to others was a motivating factor offered new insights into how relationships between people can influence in preparedness decisions. The finding that responsibility to others is a motivating factor in preparation decisions provides an example of the influence of the social environment in preparing. It indicates that people are considering their relationships with other members of the community when making preparation decisions. This highlights the connection between household preparedness and community preparedness. Encouraging people to adopt household preparedness measures can help in facilitating community level resilience to the consequences of natural hazard events.

Collectively, the quantitative and qualitative analyses add support to a literature that increasingly points to the fact that facilitating sustained preparedness involves more than just providing people with information. It involves understanding how people construe the relationship between themselves, the hazard and the protective measures available to them and assisting their protective decision making within this socio-ecological context. The qualitative study also identified issues that are unique to this study and have implications for how public education is conceptualised.

These issues address the sense of responsibility that people have toward the welfare of others and how the relevance that people attach to hazard information can result in decisions of trust or distrust in civic emergency authorities. Delivering hazard mitigation strategies thus involves engaging with community members in order to understand their needs and to render meaningful assistance in their decisions. It is when people believe that information relating to hazard mitigation is meaningful that these strategies will be attended to and adopted. The findings support the contention that effective outreach not only involves community engagement but also ensuring that information is consistent with people's beliefs and facilitates their ability to achieve outcomes that are consistent with their values.

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APPENDIX A: EARTHQUAKE SURVEY INFORMATION PACK

Participant Survey

Participant Information sheet

Participant Consent form

Community Earthquake Preparedness Questionnaire

Demographic Information (please circle a response as appropriate)

Age: _____
Gender: 1 Male 2 Female

In which of the following categories is your yearly household income:

1 $25,000 or less
2 $26,000 – 44,000
3 $45,000 – 65,000
4 $66,000 – 84,000
5 $85,000 and over

In regard to the house in which you live, do you (please tick one only):

Own/buying your house ___
Rent your house ___

Postcode _____

How long have you lived in this area _____ years

How long as your family lived in this area _____years

Critical Awareness

1. In regard to what happens in your *community*, please describe the extent to which you agree or disagree with each of the following statements:

	Once a week or more	A few times a month	Once a month	A few times a year	Rarely	Never
I think about earthquake issues and problems in my community	6	5	4	3	2	1
I think about earthquake problems and issues in my community	6	5	4	3	2	1

Action Coping

2. In regard to how you normally deal with any problem in your *life*, please describe the extent to which you agree or disagree with each of the following statements:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I try to come up with a strategy about what to do	5	4	3	2	1
I make a plan of action	5	4	3	2	1
I think hard about what steps to take	5	4	3	2	1
I think about how I might best handle the problem	5	4	3	2	1

Risk/Threat Perception

3. Please describe the extent to which you agree or disagree with each of the following statements:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Earthquakes could pose a threat to my personal safety	5	4	3	2	1
Earthquakes could pose a threat to my daily life (e.g. work, leisure)	5	4	3	2	1
Earthquakes could pose a threat to my property	5	4	3	2	1
Earthquakes could pose a threat to my community	5	4	3	2	1

Negative Outcome Expectancies

4. Please describe the extent to which you agree or disagree with each of the following statements:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Earthquakes are too destructive to bother preparing for	5	4	3	2	1
A serious earthquake is unlikely to occur during my lifetime	5	4	3	2	1
Preparing for earthquakes is inconvenient	5	4	3	2	1
It is difficult to prepare for earthquakes	5	4	3	2	1

Positive Outcome Expectancies

5. Please describe the extent to which you agree or disagree with each of the following statements:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Preparing for earthquakes will significantly reduce damage to my home should a earthquake occur	5	4	3	2	1
Preparing for earthquakes will improve my everyday living conditions	5	4	3	2	1
Preparing for earthquakes will improve the value of my house/property	5	4	3	2	1
Preparing for earthquakes will improve my ability to deal with disruptions to family/community life following a earthquake	5	4	3	2	1

Self Efficacy

6. In regard to the issues and problems you deal with in your *everyday life*, please describe the extent to which you agree or disagree with each of the following statements:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I feel I have control over the things that happen in my life	5	4	3	2	1
There is no way I can solve some of the problems I have by myself	5	4	3	2	1
I can't do much to change what happens in my life	5	4	3	2	1
Somehow problems in my life usually solve themselves	5	4	3	2	1

Intentions

7. In the next month or so, do you intend to (please circle as appropriate):

	I have done this already	I will do this	I may do this	I will not do this
Check your level of preparedness for earthquakes	4	3	2	1
Identify areas within your home that could be affected by earthquakes	4	3	2	1
Identify areas on your property that could be affected by earthquakes	4	3	2	1

Discuss earthquake protection measures with your family	4	3	2	1
Design a household earthquake protection emergency plan	4	3	2	1
Discuss evacuation procedures with your family	4	3	2	1
Design an evacuation plan in the event of a major earthquake	4	3	2	1
Increase your level of preparedness for earthquakes	4	3	2	1
Become involved with a local group to discuss how to reduce damage or losses from earthquakes	4	3	2	1
Convince your neighbours to become involved in local groups	4	3	2	1
Talk to your neighbours about earthquake protection strategies	4	3	2	1
Discuss evacuation procedures with your neighbours	4	3	2	1
Design an evacuation plan in conjunction with your neighbours	4	3	2	1
Become involved with neighbours in protecting property from the effects of earthquakes	4	3	2	1
Seek information on earthquake risk	4	3	2	1
Review information from the local council regarding earthquake protection measures	4	3	2	1
View the local council's earthquake hazard maps relating to your location	4	3	2	1
Seek information on things to do to prepare for earthquakes	4	3	2	1
Use the local media to find information regarding earthquake protection strategies	4	3	2	1
Talk to some one from the local council about earthquake protection strategies for your neighbourhood	4	3	2	1
Talk to some one from the local council about earthquake protection strategies for your property/home	4	3	2	1
Contact the local council regularly regarding earthquake protection strategies and areas at risk	4	3	2	1

8. To what extent might each of the following prevent you preparing for earthquakes? Please rate the impact of each statement from 1 (not at all) to 5 (a great deal).

	Not at all				A great deal
The cost	1	2	3	4	5
The skill or knowledge required	1	2	3	4	5
Time to do them	1	2	3	4	5
There are others things to think about	1	2	3	4	5
Need for co-operation with others	1	2	3	4	5

Negative Attitudes

9. Please read each of the following statements and describe the extent to which you agree or disagree with each.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
There may be earthquakes, but they won't be that bad	5	4	3	2	1
The location of the earthquakes will be far away from here and have little impact on us	5	4	3	2	1
The likelihood that major earthquakes will occur here has been greatly exaggerated	5	4	3	2	1
I have been fine during the earthquakes we have had and I will be fine in the next on too	5	4	3	2	1

Subjective Norms

10. What is the likelihood that the following people would view favourably a decision to adopt protective measures against earthquakes? (please circle one response per line)

	Very likely				Very unlikely
Your family	5	4	3	2	1
Your friends	5	4	3	2	1
Your work colleagues	5	4	3	2	1
Community members (e.g., church, social clubs etc.)	5	4	3	2	1

11. How likely is it that the following people would think that something could be done to prevent injury and damage in the event of a earthquake?
(please circle one response per line)

	Very likely				Very unlikely
Your family	5	4	3	2	1
Your friends	5	4	3	2	1
Your work colleagues	5	4	3	2	1
Community members (e.g., church, social clubs etc.)	5	4	3	2	1

12. How strongly do you feel the need to do what the following people think you should do?
(please circle one response per line)

	Very strongly				Not strongly at all
Your family	5	4	3	2	1
Your friends	5	4	3	2	1
Your work colleagues	5	4	3	2	1
Community members (e.g., church, social clubs etc.)	5	4	3	2	1

13. Would you agree that the opinions of the following people are important to you when deciding on a particular course of action? (please circle one response per line)

	Strongly agree				Strongly disagree
Your family	5	4	3	2	1
Your friends	5	4	3	2	1
Your work colleagues	5	4	3	2	1
Community members (e.g., church, social clubs etc.)	5	4	3	2	1

14. Would you agree that the following people would view your decision to adopt protective measures against earthquakes unfavourably? (please circle one response per line)

	Strongly disagree				Strongly agree
Your family	1	2	3	4	5
Your friends	1	2	3	4	5
Your work colleagues	1	2	3	4	5
Community members (e.g., church, social clubs etc.)	1	2	3	4	5

15. How likely would it be that you would not adopt protective measures against earthquakes if the following people viewed them unfavourably? (please circle one response per line)

	Very unlikely				Very likely
Your family	1	2	3	4	5
Your friends	1	2	3	4	5
Your work colleagues	1	2	3	4	5
Community members (e.g., church, social clubs etc.)	1	2	3	4	5

Community Participation

16. In regard to participating in activities within the wider *community*, please describe how often you undertake each of the following.

	Often	Sometimes	Rarely	Never
I have worked with others on something to improve community life	4	3	2	1
I participate in local activities or events (e.g., festivals, fetes, fairs)	4	3	2	1
I have contributed money, food or clothing to local causes, charities, or to others in my community	4	3	2	1
I have attended a public meeting on a community issue	4	3	2	1
I have been involved in volunteer activities intended to benefit my community (e.g., fundraising, clean-up days, local groups, Scouts/Brownies).	4	3	2	1

Social Support

17. In regard to your general feelings about living in this *community*, please describe the extent to which you agree or disagree with each statement.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
If need be I would trust my neighbours to watch my home when I am away	5	4	3	2	1
The friendships and associations I have with other people in my community mean a lot to me	5	4	3	2	1
People in my community lend things or exchange favours with one another	5	4	3	2	1
People in my community are happy to help one another	5	4	3	2	1
Community members are willing to provide advice to me if I ask for it.	5	4	3	2	1

Sense of Belonging

18. In regard to living in this *community* generally, please describe the extent to which you agree or disagree with each statement. In this question neighbourhood/community refers to the area in which you live.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I feel like I belong in this community	5	4	3	2	1
I believe my neighbours would help me in an emergency	5	4	3	2	1
Even if I had the opportunity, I would not move out of this community	5	4	3	2	1
I feel loyal to the people in my community	5	4	3	2	1
I often have friends over to my house to see me	5	4	3	2	1
I plan to remain a resident of this community for a number of years	5	4	3	2	1

Community Problem Solving/Articulating Problems

19. In regard to your general feelings about living in this *community*, please describe the extent to which you agree or disagree with each statement. When responding to this question, community refers to a group of which you are a member and which is important to you. This could be your neighbourhood, church, neighbourhood watch, social or sporting group etc.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
People around here will express an opinion even though they know it will be unpopular	5	4	3	2	1
When it comes to saying something in front of a group, most people in this community will do it	5	4	3	2	1
When people are needed to stand before a group of outsiders to tell them what this community needs, most people here could do it	5	4	3	2	1
In community meetings, I am often a leader	5	4	3	2	1
In community meetings I prefer to be a leader rather than a follower	5	4	3	2	1
In community meetings, I prefer others to take over the leadership role	5	4	3	2	1
What a community talks about depends on	5	4	3	2	1

what residents are interested in					
Struggles always occur to determine what issues this community should focus on	5	4	3	2	1
Community perceptions of issues depend on the quality of the individuals in that community	5	4	3	2	1
How people think about community problems controls what is done about those problems	5	4	3	2	1

Empowerment

20. In regard to what happens in the wider community, in general, to what extent do you think that:

	Always	A great deal	Sometimes	Not very much	Not at all
Voting in local elections influences what happens in my community	5	4	3	2	1
Voting in local elections helps solve local problems	5	4	3	2	1
Community groups can get something done about local problems	5	4	3	2	1
I feel that I can influence what happens in my community	5	4	3	2	1
I feel that I see positive results from participating in community activities	5	4	3	2	1
I feel that I have an active part in keeping this community going	5	4	3	2	1
I care about my community's appearance	5	4	3	2	1
I feel that what happens in this community can affect my life	5	4	3	2	1
I have strong opinions about the way things are done by elected representatives	5	4	3	2	1
I think that elected representatives seriously consider my opinions	5	4	3	2	1
I think that elected representatives try to influence what goes on in my community	5	4	3	2	1

General Trust

21. In regard to your general feelings about living in this *community*, please describe the extent to which you agree or disagree with each statement.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I trust my Local Council to respond to meet the needs of its residents	5	4	3	2	1
I trust the community leaders in my community	5	4	3	2	1
I trust the media (newspapers, TV, radio) to report fairly	5	4	3	2	1
I trust my Local Council to do what is right for the people they represent.	5	4	3	2	1
I have confidence in the law to protect and maintain order in my community	5	4	3	2	1

Specific Trust in Civic Emergency Agencies

24. With regard to the agencies responsible for managing earthquakes, please describe the extent to which you agree of disagree with the following statements:

Those responsible for managing earthquakes (e.g., emergency management)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Are knowledgeable about earthquake risk	5	4	3	2	1
Will be able to manage the risk	5	4	3	2	1
Care for members of the community	5	4	3	2	1
Are trying to minimise the risks for community members	5	4	3	2	1
Provide comprehensive information to the community	5	4	3	2	1
Provide accurate information to the community	5	4	3	2	1
Provide information that meets the needs community members	5	4	3	2	1
Provide clear information about how they will deal with a earthquake	5	4	3	2	1
Have indicated that are responsible for earthquake risk management	5	4	3	2	1
Are devoting appropriate resources for earthquake risk management	5	4	3	2	1
Reflect the values of community members	5	4	3	2	1
Will stand up for the community	5	4	3	2	1

Take peoples' beliefs into account when developing their plans	5	4	3	2	1
Include in their plans issues that the community thinks are important	5	4	3	2	1
Provide appropriate information to the community regularly	5	4	3	2	1
Provide appropriate information to the community in a timely manner	5	4	3	2	1

23. The following activities help minimise disruption to a *community* if a earthquake occurs. Please record whether they currently apply to your suburb (circle those that apply).

	Yes	**No**	**Don't Know**
Does the suburb have a earthquake response plan	3	2	1
Does the suburb have a earthquake protection plan	3	2	1
Does the local council have a earthquake response plan	3	2	1
Does the local council have a earthquake protection plan	3	2	1

24. Please rate (from 1 = not at all prepared to 5 = very prepared) the extent to which you perceive each of the following is prepared to deal with a earthquake

	Very prepared				Not prepared at all
How prepared are you for major earthquakes?	5	4	3	2	1
How well prepared do you think other members of your community are for major earthquakes	5	4	3	2	1
How well prepared do you think the local council is for major earthquakes	5	4	3	2	1

Please complete within 2 weeks of receipt
and return in the free post envelope provided

Thank you for your participation

School of Psychology

RESEARCH INFORMATION SHEET

A Means-End Chain Theory Analysis of Hazard Cognitions and Preparedness

Professor Douglas Paton (University of Tasmania), Dr David Johnston (New Zealand Institute of Geological and Nuclear Sciences, IGNS) and David McIvor (PhD Student, University of Tasmania) would like to invite you to participate in a research project, which is being undertaken by David McIvor to fulfil the requirements for a PhD degree.

This research will assess factors that influence how and why community members make decisions about preparing or nor preparing for natural hazard consequences such as earthquakes. Preparing is seen as an important factor in assisting communities to safeguard their well-being and to minimise disruption (e.g., damage to homes, loss of work) should an earthquake occur. This research will be undertaken to assess levels of preparedness and the personal and community factors that influence levels of preparedness. The enclosed questionnaire includes questions that have been identified as influencing the effectiveness of public information campaigns designed to enhance preparedness to natural hazard effects.

The outcomes of this research will be used by Napier City Council, Hawke's Bay Regional Council and the Earthquake Commission to enhance the effectiveness of public information programmes, enhance household preparedness for earthquakes, and help ensure that it meets the needs of the community.

To collect this information, questionnaires are being distributed to a random sample of 2400 households in Napier. We would like to take this opportunity to invite you to participate in this survey. Your participation will help ensure that future public natural hazard information campaigns can be targeted to meet the needs of your community.

A report summarising the findings of this survey, and information on how the findings will be used, will be published in the local newspaper and will also be available from councils, published on the IGNS (http://www.gns.cri.nz) and on the Utas School of Psychology (http://fcms.its.utas.edu.au/scieng/□sycho/) web pages. Should you wish any additional information regarding this study, please do not hesitate to contact any of the research team.

The data will be stored for five years in a locked cabinet, and all raw data will be destroyed at the end of the five-year period.

Your participation in this study is entirely voluntary. You may elect to refuse to answer any question on the questionnaire. As the questionnaire does not ask identifying information, the researchers will not know your identity. As a result, there is no way in which your responses will be identifiable to you in any research output. Please note that if you agree to participate in the interview stage of this study (see separate information sheet), the consent form for that study will be returned in the same envelope as the completed questionnaire. However, the researchers will

immediately upon receipt of the envelope separate the questionnaire and consent forms, so as to retain your anonymity at the questionnaire stage.

> The above project has received ethical approval from the Human Research Ethics Committee (Tasmania) Network. Should you have any concerns of an ethical nature or complaints about the manner in which this research is conducted, please do not hesitate to contact the Executive Officer of the Human Research Ethics Committee (Tasmania) Network:
>
> Executive Officer: Amanda McAully 0011 61 3 6226 2763, or
>
> Amanda.McAully@utas.edu.au

If you have any queries about the project please contact David Johnston (04 570 4538) Douglas Paton (Douglas.Paton@utas.edu.au) or David McIvor (dpmcivor@postoffice.utas.edu.au). If you wish to speak directly to Douglas Paton, please contact David Johnston with a contact number and he will arrange for Douglas to call you.

Your return of the enclosed questionnaire will be taken as indicative of your having read the information sheet and of your agreement to participate in this study.

I would be grateful if the oldest person in your household could complete the questionnaire and return it in the reply-paid envelope within two weeks of you receiving it. Thank you.

Please feel free to contact any should you require any further information or wish further clarification about any issue relating to this research and its objectives.

Thanking you in advance for you assistance in this project.

Douglas Paton.

University of Tasmania

A Means-End Chain Theory Analysis of Hazard Cognitions and Preparedness

Participant Information

Interviews

This research is being carried out by Professor Douglas Paton, Dr David Johnston from the Institute of Geological and Nuclear Sciences, and David McIvor (PhD Student, School of Psychology, University of Tasmania).

Douglas Paton and David McIvor can be contacted through of School of Psychology, University of Tasmania , Locked Bag 1342, Launceston, Tasmania. Telephone: 0011 3 6324 3193/3426; Email: Douglas.Paton@utas.edu.au or dpmcivor@postoffice.utas.edu.au

Dr David Johnston can be contacted through the Institue of Geological and Nuclear Sciences, Upper Hutt, Telephone: 04 578 4538; Email: D.Johnston@gns.cri.nz.

For the second component of this study, we would like to do a series of telephone interviews to allow us to explore aspects of community preparedness for earthquakes in more detail. The information obtained from these interviews will contribute to the development of public education programs designed to enhance community and household preparedness for earthquakes and ensure that future public education programs more accurately reflect the issues and needs of the people living in areas susceptible to experiencing earthquakes.

In addition to your completing the questionnaire, we would like to invite you to participate in these interviews. If you consent to be interviewed, you will be asked to supply your name, a contact telephone number, and a time when it would be most convenient to contact you, on the attached consent form.

The interview will take about 20-30 minutes of your time. It will involve an interviewer asking you a series of open ended questions about your views on earthquake preparedness. With your agreement, the interview will be recorded. The information you supply will be assigned a code number. Once the interview has been completed, the response sheet containing the name and contact details will be filed with the questionnaires in a locked cabinet. They will not be accessed again

during the course of the study. Following completion of the interviews, only the code number will be retained. Once the interview has been completed, no personal identifying information will be retained, ensuring the confidentiality and anonymity of your responses. Tapes and transcriptions will be held in a secure location for a period of five (5) years, at which time the transcripts will be shredded and the recordings destroyed.

Your participation in this interview is entirely voluntary, and evidenced by returning the signed consent form. In any case, you can decline to answer any question, and may withdraw from the interview at any time (and if so, withdraw any data you have contributed to date).
In participating in this research, no significant physical (e.g. physical harm, pain or discomfort) or psychological (e.g. emotional distress, anxiety, or embarrassment) effects, beyond the normal experience of everyday life are expected. Furthermore, the information obtained during the course of the study is not considered to be prejudicial to you in any manner, that is, there are no social or legal implications or obligations from participating in the research.

The project has received ethical approval from the Human Research Ethics Committee (Tasmania) Network. Should you have any concerns of an ethical nature or complaints about the manner in which this research is conducted, please do not hesitate to contact the Executive Officer of the Network:

Executive Officer: Amanda McAully Ph 0011 61 03 6226 2763; email: Amanda.McAully@utas.edu.au

If you are interested in reading about the findings of the project, a summary of the research findings will be available on the School of Psychology, University of Tasmania web page on completion of the study (http://fcms.its.utas.edu.au/scieng/□sycho/). This information will also be available for the Institute of Geological and Nuclear Sciences web page (http://www.gns.cri.nz) and from Napier City Council and Hawke's Bay Regional Council. Should you wish any additional information regarding this study, or wish further clarification about any issue relating to this research and its objectives, please do not hesitate to contact us.

Please keep this information sheet for your records. If you are interested in participating in the interview stage of this project, please read the attached consent form, sign it and return it with your completed questionnaire in the reply paid envelope at your earliest convenience.

Thank you for taking the time to read this information sheet. We hope you will be willing to participate in this project.
.

Douglas Paton David Johnston David McIvor

University of Tasmania

Modelling community resilience: A multi-level approach to assessment and capacity building

Interviews Consent Form

1. I have read and understood the 'Information Sheet' for this study.
2. The reasons for the study, what it will involve, and the possible effects of the study have been explained to me.
3. I understand that an interview will be conducted with me to obtain an understanding of my views on earthquake preparedness. It is my understanding that the interview will take approximately 20-30 minutes to complete.
4. With my agreement, the interview can be recorded. I have the right to request that the interview is not recorded.
5. I agree that information gathered for the study may be published provided that I cannot be identified as a participant. I also understand that while my interview will be recorded, my anonymity will be assured, as it is not necessary to record my name or any other identifying information in this recording.
6. I understand that all research data will be securely stored in the School of Psychology, University of Tasmania in a secure location for a period of five years and that the recordings and the data will be destroyed at the end of five years.
7. I understand that no psychological distress or inconvenience beyond the normal experience of everyday life is expected.
8. Any questions that I have asked have been answered to my satisfaction.
9. I agree to participate in the interview session and understand that my participation is voluntary, that I may withdraw at any time without being penalised or disadvantaged in any way, and that I may **withdraw from participation at any time and withdraw any information/data supplied to date**

I am happy to have the interview tape recorded: Yes No

Name of participant:...……(please print)

Signature of participant:…..…… Date:……..

Contact Number:……Preferred time to call (Date/time)……

Statement by investigator:

I have explained this project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

Name of Investigator:…… Signature ……
Date:……...

Name of Investigator:…… Signature ……
Date:……...

Name of Investigator:…… Signature ……
Date:……

APPENDIX B: FLOOD SURVEY INFORMATION PACK

Participant survey

Participant information sheet

Participant consent

Community Flood Preparedness Questionnaire

Demographic Information (please circle a response as appropriate)

Age: _____
Gender: 1 Male 2 Female

In regard to the house in which you live, do you (please tick one only):
Own/buying your house ___
Rent your house ___

Postcode _____

How long have you lived in this area _____ years

How long as your family lived in this area _____years

Critical Awareness

1. **In regard to what happens in your *community*, please describe the extent to which you agree or disagree with each of the following statements:**

	Once a week or more	A few times a month	Once a month	A few times a year	Rarely	Never
I think about flood issues and problems in my community	6	5	4	3	2	1
I talk about flood problems and issues with others in my community	6	5	4	3	2	1

Action Planning

2. **In regard to how you normally deal with any problem in your *life*, please describe the extent to which you agree or disagree with each of the following statements:**

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I try to come up with a strategy about what to do	5	4	3	2	1
I make a plan of action	5	4	3	2	1
I think hard about what steps to take	5	4	3	2	1
I think about how I might best handle the problem	5	4	3	2	1

Negative Outcome Expectancies

3. Please describe the extent to which you agree or disagree with each of the following statements:

	Strongly agree	Agree	Neither agree Nor disagree	Disagree	Strongly disagree
Floods are too destructive to bother preparing for	5	4	3	2	1
A serious flood is unlikely to occur during my lifetime	5	4	3	2	1
Preparing for floods is inconvenient	5	4	3	2	1
It is difficult to prepare for floods	5	4	3	2	1

Positive Outcome Expectancies

4. Please describe the extent to which you agree or disagree with each of the following statements:

	Strongly agree	Agree	Neither agree Nor disagree	Disagree	Strongly disagree
Preparing for floods will significantly reduce damage to my home should a flood occur	5	4	3	2	1
Preparing for floods will improve my everyday living conditions	5	4	3	2	1
Preparing for floods will improve the value of my house/property	5	4	3	2	1
Preparing for floods will improve my ability to deal with disruptions to family/community life following a flood	5	4	3	2	1

Self Efficacy

5. In regard to the issues and problems you deal with in your *everyday life*, please describe the extent to which you agree or disagree with each of the following statements:

	Strongly agree	Agree	Neither agree Nor disagree	Disagree	Strongly disagree
I feel I have control over the things that happen in my life	5	4	3	2	1
There is no way I can solve some of the problems I have by myself	5	4	3	2	1
I can't do much to change what happens in my life	5	4	3	2	1
Somehow problems in my life usually solve themselves	5	4	3	2	1

Intentions

6. In the next month or so, do you intend to (please circle as appropriate):

	I will do this	I may do this	I will not do this
Check your level of preparedness for floods	3	2	1
Increase your level of preparedness for floods	3	2	1
Become involved with a local group to discuss how to reduce damage or losses from floods	3	2	1
Seek information on flood risk	3	2	1
Seek information on things to do to prepare for floods	3	2	1

Negative Attitudes

7. Please read each of the following statements and describe the extent to which you agree or disagree with each.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
There may be floods, but they won't be that bad	5	4	3	2	1
The location of the floods will be far away from here and have little impact on us	5	4	3	2	1
The likelihood that major floods will occur here has been greatly exaggerated	5	4	3	2	1
I have been fine during the floods we have had and I will be fine in the next one too	5	4	3	2	1

Subjective Norms

8. What is the likelihood that the following people would view favourably a decision to adopt protective measures against floods? (Please circle one response per line)

	Very likely	Likely	Neither likely nor unlikely	Unlikely	Very unlikely
Your family	5	4	3	2	1
Your friends	5	4	3	2	1
Your work colleagues	5	4	3	2	1
Community members (e.g., church, social clubs etc.)	5	4	3	2	1

9. Would you agree that the opinions of the following people are important to you when deciding on a particular course of action? (Please circle one response per line)

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Your family	5	4	3	2	1
Your friends	5	4	3	2	1
Your work colleagues	5	4	3	2	1
Community members (e.g. church, social clubs etc.)	5	4	3	2	1

Community Participation

10. In regard to participating in activities within the wider *community*, please describe how often you undertake each of the following.

	Often	Sometimes	Rarely	Never
I have worked with others on something to improve community life	4	3	2	1
I participate in local activities or events (e.g., festivals, fetes, fairs)	4	3	2	1
I have contributed money, food or clothing to local causes, charities, or to others in my community	4	3	2	1
I have attended a public meeting on a community issue	4	3	2	1
I have been involved in volunteer activities intended to benefit my community (e.g., fundraising, clean-up days, local groups, Scouts/Brownies).	4	3	2	1

Sense of Community

11. In regard to living in this *community* generally, please describe the extent to which you agree or disagree with each statement. In this question neighbourhood/community refers to the area in which you live.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I feel like I belong in this community	5	4	3	2	1
I believe my neighbours would help me in an emergency	5	4	3	2	1
Even if I had the opportunity, I would not move out of this community	5	4	3	2	1
I feel loyal to the people in my community	5	4	3	2	1
I often have friends over to my house to see me	5	4	3	2	1
I plan to remain a resident of this community for a number of years	5	4	3	2	1

Articulating Problems

12. In regard to your general feelings about living in this *community*, please describe the extent to which you agree or disagree with each statement. When responding to this question, community refers to a group of which you are a member and which is important to you. This could be your neighbourhood, church, neighbourhood watch, social or sporting group etc.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
What a community talks about depends on what residents are interested in	5	4	3	2	1
Struggles always occur to determine what issues this community should focus on	5	4	3	2	1
Community perceptions of issues depend on the quality of the individuals in that community	5	4	3	2	1
How people think about community problems controls what is done about those problems	5	4	3	2	1

Empowerment

13. In regard to what happens in the wider community, in general, to what extent do you think that:

	Always	A great deal	Sometimes	Not very much	Not at all
I feel that I can influence what happens in my community	5	4	3	2	1
I feel that I see positive results from participating in community activities	5	4	3	2	1
I feel that I have an active part in keeping this community going	5	4	3	2	1
I think that elected representatives seriously consider my opinions	5	4	3	2	1

General Trust

14. In regard to your general feelings about living in this *community*, please describe the extent to which you agree or disagree with each statement.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I trust my Local Council to respond to meet the needs of its residents	5	4	3	2	1
I trust the community leaders in my community	5	4	3	2	1
I trust the media (newspapers, TV, radio) to report fairly	5	4	3	2	1
I trust my Local Council to do what is right for the people they represent.	5	4	3	2	1
I have confidence in the law to protect and maintain order in my community	5	4	3	2	1

15. Please rate (from 1 = not at all prepared to 5 = very prepared) the extent to which you perceive each of the following is prepared to deal with a flood

	Very prepared				Not very prepared at all
How prepared are you for major floods?	5	4	3	2	1
How well prepared do you think other members of your community are for major floods	5	4	3	2	1
How well prepared do you think the local council is for major floods	5	4	3	2	1

Implementation Intentions

16. Please indicate the extent to which you have anticipated what actions are necessary to minimise flood damage:

	I will do this	I may do this	I will not do this
Find out exactly how to prepare for floods	3	2	1
Identify specific areas of my house that need to be protected against floods	3	2	1
Begin preparing for floods by a particular date	3	2	1

17. Please write below precisely when, where and how you will plan to initiate flood preparation procedures:

_____
_____
_____
_____
_____
_____
_____

Actual Preparing

18. Please indicate the extent to which you have initiated preparation activities

	I have done this already	I will do this	I may do this	I will not do this
I have viewed flood maps of this area	4	3	2	1
I have designed a household flood emergency plan	4	3	2	1
I have prepared an emergency kit	4	3	2	1
I check the contents/operation of my emergency kit every month	4	3	2	1
I have placed important documents (e.g. insurance policies, deeds etc.) in a watertight container and stored it in a high place in the house	4	3	2	1
I have raised the electrical panel to a high position above the projected flood level	4	3	2	1
I have installed check valves in sewer traps to prevent floodwater from backing up into the drains of the house	4	3	2	1
I have replaced carpets with removable floor rugs and/or tiled floors	4	3	2	1
I have put aside spare plastic bags and toilet paper for use as an emergency toilet	4	3	2	1

Please complete within 2 weeks of receipt and return in the free post envelope provided

Thank you for your participation

School of Psychology

RESEARCH INFORMATION SHEET

Modelling community resilience: A multi-level approach to assessment and capacity building

Professor Douglas Paton (University of Tasmania), Dr Alison Cottrell (James Cook University) and David McIvor (PhD Student, University of Tasmania) would like to invite you to participate in a research project, which is being undertaken by David McIvor to fulfil the requirements for a PhD degree.

The research project is being undertaken to identify the household and community factors that influence how community members prepare for and cope with flooding. The enclosed questionnaire includes questions that have been identified as being able to help us understand how people make decisions about managing risk from floods.

The outcomes of this research will be used by civic emergency planning agencies to enhance the effectiveness of public education programs, enhance household preparedness for flooding, and help ensure that these plans and activities will meets the needs of the community. To collect this information, questionnaires are being distributed to a random sample of 1000 households in Launceston, TAS and Benalla, VIC.

We would like to take this opportunity to invite you to participate in this survey. Your participation will help ensure that future flood mitigation and preparedness programs can be targeted to meet the needs of your community and increase community participation in the development and management of these risk management programs.

A report summarising the findings of this survey, and information on how the findings will be used, will be published in the local newspapers, available from local councils, and published on the UTas School of Psychology (http://fcms.its.utas.edu.au/scieng/psychol/) web pages. Should you wish any additional information regarding this study, please do not hesitate to contact any of the research team.

The data will be stored for five years in a locked cabinet, and all raw data will be destroyed at the end of the five-year period.

Your participation in this study is entirely voluntary. You may elect to refuse to answer any question on the questionnaire. As the questionnaire does not ask identifying information, the researchers will not know your identity. As a result, there is no way in which your responses will be identifiable to you in any research output.

Please note that this study also has an interview stage (see separate information sheet). If you agree to participate in the interview stage, we would be grateful if you could return the consent form for that study in the same envelope as the completed

questionnaire. However, the researchers will immediately upon receipt of the envelope separate the questionnaire and consent forms so as to retain your anonymity at the questionnaire stage.

> The above project has received ethical approval from the Human Research Ethics Committee (Tasmania) Network. Should you have any concerns of an ethical nature or complaints about the manner in which this research is conducted, please do not hesitate to contact the Executive Officer of the Network (Ph 6226 2763).

If you have any queries about the project please contact Douglas Paton (Tel: 03 6324 3193; Email: (Douglas.Paton@utas.edu.au), David McIvor (03 6324 3193; Email: dpmcivor@postoffice.utas.edu.au), or Alison Cottrell (Tel: 07 4781 4653; Email: alison.cottrell@jcu.edu.au).

Your return of the enclosed questionnaire will be taken as indicative of your having read the information sheet and of your agreement to participate in the survey component of this study.

We would be grateful if the oldest person in your household could complete the questionnaire and return it in the reply-paid envelope within two weeks of you receiving it. Thank you.

Please feel free to contact any of the above named people should you require any further information or wish further clarification about any issue relating to this research and its objectives.

Thanking you in advance for you assistance in this project.

Douglas Paton Alison Cottrell David McIvor

University of Tasmania

Modelling community resilience: A multi-level approach to assessment and capacity building

Participant Information
Interviews

This research is being carried out by Professor Douglas Paton (University of Tasmania), Dr Alison Cottrell (James Cook University, QLD), and David McIvor (PhD Student, School of Psychology, University of Tasmania).

Douglas Paton and David McIvor can be contacted through of School of Psychology, University of Tasmania, Locked Bag 1342, Launceston, Tasmania. Telephone: (03) 6324 3193/3426; Email: Douglas.Paton@utas.edu.au or dpmcivor@postoffice.utas.edu.au. Dr Alison Cottrell can be contacted through James Cook University, Townsville, Queensland Telephone: 07 4781 4653; Email: alison.cottrell@jcu.edu.au.

For the second component of this study, we would like to do a series of telephone interviews to allow us to explore aspects of community preparedness for floods in more detail. The information obtained from these interviews will contribute to the development of public education programs designed to enhance community and household preparedness for flooding and ensure that future public education programs more accurately reflect the issues and needs of the people living in areas susceptible to experiencing floods.

In addition to your completing the questionnaire, we would like to invite you to participate in these interviews. If you consent to be interviewed, you will be asked to supply your name, a contact telephone number, and a time when it would be most convenient to contact you, on the attached consent form.

The interview will take about 20-30 minutes of your time. It will involve an interviewer asking you a series of open ended questions about your views on flood preparedness. With your agreement, the interview will be recorded. The information you supply will be assigned a code number. Once the interview has been completed, the response sheet containing the name and contact details will be filed with the questionnaires in a locked cabinet. They will not be accessed again during the course of the study. Following completion of the interviews, only the code number will be retained. Once the interview has been completed, no personal identifying information will be retained, ensuring the confidentiality and anonymity

of your responses. Tapes and transcriptions will be held in a secure location for a period of five (5) years, at which time the transcripts will be shredded and the recordings destroyed.

Your participation in this interview is entirely voluntary, and evidenced by returning the signed consent form. In any case, you can decline to answer any question, and may withdraw from the interview at any time (and if so, withdraw any data you have contributed to date).
In participating in this research, no significant physical (e.g. physical harm, pain or discomfort) or psychological (e.g. emotional distress, anxiety, or embarrassment) effects, beyond the normal experience of everyday life are expected. Furthermore, the information obtained during the course of the study is not considered to be prejudicial to you in any manner, that is, there are no social or legal implications or obligations from participating in the research.

The project has received ethical approval from the Human Research Ethics Committee (Tasmania) Network. Should you have any concerns of an ethical nature or complaints about the manner in which this research is conducted, please do not hesitate to contact the Executive Officer of the Network:

Executive Officer: Amanda McAully Ph 0011 61 03 6226 2763;
email: Amanda.McAully@utas.edu.au

If you are interested in reading about the findings of the project, a summary of the research findings will be available on the School of Psychology, University of Tasmania web page on completion of the study (http://fcms.its.utas.edu.au/scieng/psychol/).

Should you wish any additional information regarding this study, or wish further clarification about any issue relating to this research and its objectives, please do not hesitate to contact us.

Please keep this information sheet for your records. If you are interested in participating in the interview stage of this project, please read the attached consent form, sign it and return it with your completed questionnaire in the reply paid envelope at your earliest convenience.

Thank you for taking the time to read this information sheet. We hope you will be willing to participate in this project.

Douglas Paton Alison Cottrell David McIvor

University of Tasmania

Modelling community resilience: A multi-level approach to assessment and capacity building

Interviews Consent Form

1. I have read and understood the 'Information Sheet' for this study.
2. The reasons for the study, what it will involve, and the possible effects of the study have been explained to me.
3. I understand that an interview will be conducted with me to obtain an understanding of my views on flood preparedness. It is my understanding that the interview will take approximately 20-30 minutes to complete.
4. With my agreement, the interview can be recorded. I have the right to request that the interview is not recorded.
5. I agree that information gathered for the study may be published provided that I cannot be identified as a participant. I also understand that while my interview will be recorded, my anonymity will be assured, as it is not necessary to record my name or any other identifying information in this recording.
6. I understand that all research data will be securely stored in the School of Psychology, University of Tasmania in a secure location for a period of five years and that the recordings and the data will be destroyed at the end of five years.
7. I understand that no psychological distress or inconvenience beyond the normal experience of everyday life is expected.
8. Any questions that I have asked have been answered to my satisfaction.
9. I agree to participate in the interview session and understand that my participation is voluntary, that I may withdraw at any time without being penalised or disadvantaged in any way, and that I may **withdraw from participation at any time and withdraw any information/data supplied to date**

I am happy to have the interview tape recorded: Yes No

Name of participant:...……(please print)

Signature of participant:…..…… Date:……..

Contact Number:……Preferred time to call (Date/time)……

Statement by investigator:

I have explained this project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

Name of Investigator:……..Signature……..
Date:…….

Name of Investigator:……..Signature …….
Date:…….

Name of Investigator:……..Signature …….
Date:…….

APPENDIX C: STRUCTURAL EQUATION MODELLING RAW DATA

Earthquake data (Napier, New Zealand

Flood data (Benalla Vic, Invermay Tas, Longford Tas., Ingham Qld)

Napier Data

Scalar Estimates (Group number 1 – Default model) Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

		Estimate	S.E.	C.R.	P	Label
Articulate	<--- PosOutExp	.111	.051	2.167	.030	par_5
Empower	<--- Articulate	.161	.069	2.352	.019	par_1
Empower	<--- CommPart	.302	.041	7.382	***	par_2
Empower	<--- PosOutExp	.119	.056	2.132	.033	par_4
GenTrust	<--- Empower	.414	.088	4.729	***	par_12
GenTrust	<--- CommPart	-.220	.064	-3.449	***	par_14
Intentions	<--- NegOutExp	-1.265	.267	-4.732	***	par_3
Intentions	<--- CommPart	1.141	.190	6.011	***	par_7
Intentions	<--- PosOutExp	1.681	.279	6.022	***	par_8
Intentions	<--- GenTrust	.578	.198	2.913	.004	par_13

Standardized Regression Weights: (Group number 1 - Default model)

		Estimate
Articulate	<--- PosOutExp	.134
Empower	<--- Articulate	.132
Empower	<--- CommPart	.414
Empower	<--- PosOutExp	.118
GenTrust	<--- Empower	.318
GenTrust	<--- CommPart	-.232
Intentions	<--- NegOutExp	-.252
Intentions	<--- CommPart	.302
Intentions	<--- PosOutExp	.323
Intentions	<--- GenTrust	.145

Covariances: (Group number 1 - Default model)

		Estimate	S.E.	C.R.	P	Label
NegOutExp	<--> PosOutExp	-2.439	.451	-5.404	***	par_6
CommPart	<--> PosOutExp	1.179	.570	2.068	.039	par_9
CommPart	<--> NegOutExp	-.672	.578	-1.163	.245	par_10
ER1	<--> CommPart	1.432	.466	3.075	.002	par_11

Correlations: (Group number 1 - Default model)

			Estimate
NegOutExp	<-->	PosOutExp	-.360
CommPart	<-->	PosOutExp	.131
CommPart	<-->	NegOutExp	-.072
ER1	<-->	CommPart	.194

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
CommPart	12.459	1.103	11.292	***	par_15
NegOutExp	7.032	.623	11.292	***	par_16
PosOutExp	6.538	.579	11.292	***	par_17
ER1	4.353	.385	11.292	***	par_18
ER2	5.013	.444	11.292	***	par_19
ER3	10.234	.906	11.292	***	par_20
ER4	111.517	9.876	11.292	***	par_21

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Articulate	.018
Empower	.242
GenTrust	.088
Intentions	.371

Matrices (Group number 1 - Default model)

Residual Covariances (Group number 1 - Default model)

	PosOutExp	NegOutExp	CommPart	Articulate	Empower	GenTrust	Intentions
PosOutExp	.000						
NegOutExp	.000	.000					
CommPart	.000	.136	-.010				
Articulate	.000	.412	-.016	.000			
Empower	.000	.435	-.006	-.005	-.002		
GenTrust	.474	.573	.000	.093	.000	.000	
Intentions	.274	.486	-.183	.145	1.340	.072	-.322

Standardized Residual Covariances (Group number 1 - Default model)

	PosOut Exp	NegOut Exp	Comm Part	Articulate	Empower	Gen Trust	Intentions
PosOutExp	.000						
NegOutExp	.000	.000					
CommPart	.000	.231	-.009				
Articulate	.000	1.177	-.033	.000			
Empower	.000	1.015	-.009	-.014	-.004		
GenTrust	.884	1.030	.000	.210	.000	.000	
Intentions	.117	.205	-.059	.082	.606	.026	-.020

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	21	6.757	7	.455	.965
Saturated model	28	.000	0		
Independence model	7	272.989	21	.000	12.999

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.339	.993	.970	.248
Saturated model	.000	1.000		
Independence model	5.592	.749	.665	.562

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.975	.926	1.001	1.003	1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.333	.325	.333
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.000	.000	10.140
Saturated model	.000	.000	.000
Independence model	251.989	202.362	309.064

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.026	.000	.000	.040
Saturated model	.000	.000	.000	.000
Independence model	1.071	.988	.794	1.212

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.000	.000	.075	.790
Independence model	.217	.194	.240	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	48.757	50.117	123.206	144.206
Saturated model	56.000	57.814	155.265	183.265
Independence model	286.989	287.442	311.805	318.805

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.191	.192	.232	.197
Saturated model	.220	.220	.220	.227
Independence model	1.125	.931	1.349	1.127

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	531	698
Independence model	31	37

Combined flood data (Benalla, Invermay, Longford, Ingham) 1st model (significant chi-squared)

Scalar Estimates (Group number 1 - Default model) Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

		Estimate	S.E.	C.R.	P	Label
Articulate	<--- PosOutExp	.124	.035	3.486	***	par_5
Empower	<--- Articulate	.203	.073	2.778	.005	par_1
Empower	<--- CommPart	.498	.039	12.690	***	par_2
Empower	<--- PosOutExp	.094	.042	2.243	.025	par_4
GenTrust	<--- Empower	.532	.102	5.205	***	par_12
GenTrust	<--- CommPart	-.181	.085	-2.139	.032	par_14
Intentions	<--- NegOutExp	-.193	.066	-2.907	.004	par_3
Intentions	<--- CommPart	.160	.054	2.942	.003	par_7
Intentions	<--- PosOutExp	.262	.060	4.389	***	par_8
Intentions	<--- GenTrust	.104	.049	2.146	.032	par_13

Standardized Regression Weights: (Group number 1 - Default model)

		Estimate
Articulate	<--- PosOutExp	.210
Empower	<--- Articulate	.132
Empower	<--- CommPart	.602
Empower	<--- PosOutExp	.105
GenTrust	<--- Empower	.403
GenTrust	<--- CommPart	-.166
Intentions	<--- NegOutExp	-.167
Intentions	<--- CommPart	.169
Intentions	<--- PosOutExp	.253
Intentions	<--- GenTrust	.120

Covariances: (Group number 1 - Default model)

		Estimate	S.E.	C.R.	P	Label
NegOutExp	<--> PosOutExp	-2.466	.686	-3.596	***	par_6
CommPart	<--> PosOutExp	2.426	.823	2.950	.003	par_9
CommPart	<--> NegOutExp	-2.121	.718	-2.953	.003	par_10
ER1	<--> CommPart	1.814	.466	3.895	***	par_11

Correlations: (Group number 1 - Default model)

			Estimate
NegOutExp	<-->	PosOutExp	-.227
CommPart	<-->	PosOutExp	.185
CommPart	<-->	NegOutExp	-.180
ER1	<-->	CommPart	.241

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
CommPart	14.246	1.241	11.481	***	par_15
NegOutExp	9.736	.849	11.467	***	par_16
PosOutExp	12.078	1.053	11.467	***	par_17
ER1	3.990	.348	11.467	***	par_18
ER2	5.245	.457	11.467	***	par_19
ER3	15.233	1.328	11.467	***	par_20
ER4	10.440	.910	11.467	***	par_21

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Articulate	.044
Empower	.463
GenTrust	.102
Intentions	.190

Matrices (Group number 1 - Default model)

Residual Covariances (Group number 1 - Default model)

	PosOutExp	NegOutExp	CommPart	Articulate	Empower	GenTrust	Intentions
PosOutExp	.000						
NegOutExp	.000	.000					
CommPart	.000	-.097	.034				
Articulate	.000	-.214	.038	.000			
Empower	.000	-.891	.025	.019	.016		
GenTrust	2.735	.428	.007	.576	.004	.001	
Intentions	.286	.029	.025	.329	.688	.634	.139

Standardized Residual Covariances (Group number 1 - Default model)

	PosOutExp	NegOutExp	CommPart	Articulate	Empower	GenTrust	Intentions
PosOutExp	.000						
NegOutExp	.000	.000					
CommPart	.000	-.132	.028				
Articulate	.000	-.543	.076	.000			
Empower	.000	-1.467	.028	.045	.019		
GenTrust	3.091	.540	.007	1.105	.005	.001	
Intentions	.353	.041	.029	.723	.969	.687	.124

Modification Indices (Group number 1 - Default model)

Covariances: (Group number 1 - Default model)

	M.I.	Par Change
ER3 <--> PosOutExp	13.410	2.947

Variances: (Group number 1 - Default model)

	M.I.	Par Change

Regression Weights: (Group number 1 - Default model)

	M.I.	Par Change
GenTrust <--- PosOutExp	10.694	.226

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	21	21.217	7	.003	3.031
Saturated model	28	.000	0		
Independence model	7	329.555	21	.000	15.693

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.596	.978	.911	.244
Saturated model	.000	1.000		
Independence model	2.632	.701	.602	.526

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.936	.807	.956	.862	.954
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.333	.312	.318
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	14.217	3.993	32.042
Saturated model	.000	.000	.000
Independence model	308.555	253.466	371.084

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.081	.054	.015	.122
Saturated model	.000	.000	.000	.000
Independence model	1.253	1.173	.964	1.411

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.088	.047	.132	.063
Independence model	.236	.214	.259	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	63.217	64.535	138.312	159.312
Saturated model	56.000	57.757	156.127	184.127
Independence model	343.555	343.994	368.586	375.586

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.240	.201	.308	.245
Saturated model	.213	.213	.213	.220
Independence model	1.306	1.097	1.544	1.308

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	175	230
Independence model	27	32

Combined flood data (Benalla, Invermay, Longford, Ingham) 2nd model (non-significant chi-squared

Scalar Estimates (Group number 1 - Default model) Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Articulate	<---	PosOutExp	.124	.035	3.486	***	par_5
Empower	<---	Articulate	.203	.073	2.778	.005	par_1
Empower	<---	CommPart	.498	.039	12.690	***	par_2
Empower	<---	PosOutExp	.094	.042	2.243	.025	par_4
GenTrust	<---	Empower	.474	.101	4.680	***	par_12
GenTrust	<---	CommPart	-.191	.083	-2.302	.021	par_14
GenTrust	<---	PosOutExp	.241	.070	3.449	***	par_15
Intentions	<---	NegOutExp	-.193	.066	-2.907	.004	par_3
Intentions	<---	CommPart	.160	.054	2.950	.003	par_7
Intentions	<---	PosOutExp	.262	.061	4.264	***	par_8
Intentions	<---	GenTrust	.104	.050	2.083	.037	par_13

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Articulate	<---	PosOutExp	.210
Empower	<---	Articulate	.132
Empower	<---	CommPart	.602
Empower	<---	PosOutExp	.105
GenTrust	<---	Empower	.360
GenTrust	<---	CommPart	-.175
GenTrust	<---	PosOutExp	.203
Intentions	<---	NegOutExp	-.166
Intentions	<---	CommPart	.168
Intentions	<---	PosOutExp	.252
Intentions	<---	GenTrust	.119

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
NegOutExp	<-->	PosOutExp	-2.466	.686	-3.596	***	par_6
CommPart	<-->	PosOutExp	2.426	.823	2.950	.003	par_9
CommPart	<-->	NegOutExp	-2.121	.718	-2.953	.003	par_10
ER1	<-->	CommPart	1.814	.466	3.895	***	par_11

Correlations: (Group number 1 - Default model)

			Estimate
NegOutExp	<-->	PosOutExp	-.227
CommPart	<-->	PosOutExp	.185
CommPart	<-->	NegOutExp	-.180
ER1	<-->	CommPart	.241

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
CommPart	14.246	1.241	11.481	***	par_16
NegOutExp	9.736	.849	11.467	***	par_17
PosOutExp	12.078	1.053	11.467	***	par_18
ER1	3.990	.348	11.467	***	par_19
ER2	5.245	.457	11.467	***	par_20
ER3	14.574	1.271	11.467	***	par_21
ER4	10.440	.910	11.467	***	par_22

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Articulate	.044
Empower	.463
GenTrust	.141
Intentions	.200

Matrices (Group number 1 - Default model)

Residual Covariances (Group number 1 - Default model)

	PosOutExp	NegOutExp	CommPart	Articulate	Empower	GenTrust	Intentions
PosOutExp	.000						
NegOutExp	.000	.000					
CommPart	.000	-.097	.034				
Articulate	.000	-.214	.038	.000			
Empower	.000	-.891	.025	.019	.016		
GenTrust	.000	.924	.005	.354	.003	.000	
Intentions	.000	.081	.025	.306	.688	-.177	-.030

Standardized Residual Covariances (Group number 1 - Default model)

	PosOutExp	NegOutExp	CommPart	Articulate	Empower	GenTrust	Intentions
PosOutExp	.000						
NegOutExp	.000	.000					
CommPart	.000	-.132	.028				
Articulate	.000	-.543	.076	.000			
Empower	.000	-1.467	.028	.045	.019		
GenTrust	.000	1.164	.005	.678	.004	.000	
Intentions	.000	.113	.029	.668	.963	-.189	-.026

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	22	9.583	6	.143	1.597
Saturated model	28	.000	0		
Independence model	7	329.555	21	.000	15.693

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.295	.990	.953	.212
Saturated model	.000	1.000		
Independence model	2.632	.701	.602	.526

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.971	.898	.989	.959	.988
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.286	.277	.282
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	3.583	.000	16.192
Saturated model	.000	.000	.000
Independence model	308.555	253.466	371.084

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.036	.014	.000	.062
Saturated model	.000	.000	.000	.000
Independence model	1.253	1.173	.964	1.411

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.048	.000	.101	.462
Independence model	.236	.214	.259	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	53.583	54.963	132.254	154.254
Saturated model	56.000	57.757	156.127	184.127
Independence model	343.555	343.994	368.586	375.586

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.204	.190	.252	.209
Saturated model	.213	.213	.213	.220
Independence model	1.306	1.097	1.544	1.308

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	346	462
Independence model	27	32

APPENDIX D: INTERVIEW SCHEDULE FOR NAPIER, BENALLA AND INVERMAY PARTICIPANTS

Interview Schedule

- How would you rate the value of preparing for floods – either very important of not important at all?

- Are there any specific things you have done around the home to minimise the effects of flooding? (Why did you/why didn't you?)

- Can you list some reasons why you think it is important to adopt these measures?

- Where did you get this information from?
    - Why did you think this information was useful?

- Have you discussed flood issues with others? (Why did you/why didn't you?)
    - What/who influenced you to discuss these issues?
    - Did this help in clarifying issues?
    - Would it influence you to become more involved in the wider community?

- Have you had any contact with the council/emergency services regarding floods?
    - Have they contacted you?
    - How satisfactory was this contact?

- Do people in your neighbourhood have an active role in community affairs?
    - What groups are involved
    - Are you involved?
    - Do you think these groups make a difference?

- Are these groups involved in actively encouraging people to prepare for floods?

In what way could you or others influence people to prepare for floods?

APPENDIX E: RAW DATA FOR MEANS END CHAIN ANALYSIS AND HIERARCHICAL VALUE MAPPING

Raw ladder data for Napier, Benalla and Invermay interview data

Implication matrices for Napier, Benalla and Invermay interview data

Napier Raw ladder data for Means-End Chain and Hierarchical Value Maps

1	(A) Previous experience	Alan 1st ladder	2	6	20				
2	(A) Hazard knowledge	Alan 2nd ladder	2	6	35				
3	(A) Early warning	Alan 3rd ladder	2	6	27				
4	(A) Shared experiences	Alan 4th ladder	2	8	24				
5	(A) Ease of preparing	Alan 5th ladder	2	18	27				
6	(A) Belief in preparing	Alan 6th ladder	2	27					
7	(A) Relevance	Alan 7th ladder	2	26	28	27			
8	(A) Salience	Alan 8 ladder	2	26	28	35			
9	(A) Receptive to ideas	Alan 9 ladder	2	26	28	33			
10	(A) Individual responsibility	Alan 10 ladder	2	17	27				
11	(A) Sources of information	Alan 11 ladder	1	6	20				
12	(A) Fatalism	Alan 12 ladder	1	6	35				
13	(A) Inconvenience	Alan 13 ladder	1	6	27				
14	(A) Influence of others	Alan 14 ladder	1	18	27				
15	(A) Reticence	Alan 15 ladder	1	35					
16	(A) Awareness of preparing								
17	(A) Active preparing	Bruce 1st ladder	10	21	35				
18	(C) Thinking about issues	Bruce 2nd ladder	2	18					
19	(C) Discussing issues	Bruce 3rd ladder	2	26					
20	(C) Confident	Bruce 4th ladder	2	28					
21	(C) Community Involvement	Bruce 5th ladder	2	11	18				
22	(C) Uncertainty	Bruce 6th ladder	2	11	4	18			
23	(C) Lack of motivation	Bruce 7th ladder	2	25	36				
24	(C) Reticence in talking	Bruce 8th ladder	2	12	18				
25	(C) Unprepared	Bruce 9th ladder	2	12	34				
26	(C) Physical protection	Bruce 10th ladder	2	12	25	36			
27	(C) Self sustaining	Bruce 11th ladder	2	12	22	25	36		
28	(C) Shelter	Bruce 12 ladder	2	12	22	34			
29	(C) Transferring responsibility	Bruce 13 ladder	1	8	12	18			
30	(C) Distrust	Bruce 14 ladder	1	8	12	34			
31	(C) Trust	Bruce 15 ladder	1	8	12	25	36		
32	(V) Protection of possesions	Bruce 16 ladder	1	8	12	22	25	36	
33	(V) Protection	Bruce 17 ladder	1	8	12	22	34		
34	(V) Return to normal	Bruce 18 ladder	1	8	12	18			
35	(V) Responsibility to others	Bruce 19 ladder	1	8	12	34			
36	(V) Survival	Bruce 20 ladder	1	8	12	25	36		
37	(V) Peace of mind	Bruce 21 ladder	1	8	12	22	25	36	
		Bruce 22 ladder	1	8	12	22	34		
		Bruce 23 ladder	1	26					
1	(A) Previous experience	Bruce 24 ladder	1	34					
2	(A) Hazard knowledge	Bruce 25 ladder	1	25	36				
3	(A) Early warning	Bruce 26 ladder	1	22	25	36			
4	(A) Shared experiences	Bruce 27 ladder	1	22	34				
5	(A) Ease of preparing								
6	(A) Belief in preparing								
7	(A) Relevance	Claire 1st ladder	8	25	19	37			
8	(A) Salience	Claire 2nd ladder	8	19	37				
9	(A) Receptive to ideas	Claire 3rd ladder	8	24					
10	(A) Individual responsibility	Claire 4th ladder	8	23					
11	(A) Sources of information	Claire 5 ladder	8	16	26				
12	(A) Fatalism	Claire 6 ladder	8	16	27	36			
13	(A) Inconvenience	Claire 7 ladder	8	16	17				
14	(A) Influence of others	Claire 8 ladder	8	11	17				
15	(A) Reticence	Claire 9 ladder	8	11	14	37			
16	(A) Awareness of preparing	Claire 10 ladder	7	11	17				
17	(A) Active preparing	Claire 11 ladder	7	11	14	37			
18	(C) Thinking about issues	Claire 12 ladder	7	22					
19	(C) Discussing issues	Claire 13 ladder	7	18	31				
20	(C) Confident	Claire 14 ladder	7	31					
21	(C) Community Involvement								
22	(C) Uncertainty	Darren 1st ladder	14	8	23				
23	(C) Lack of motivation	Darren 2nd ladder	14	8	25				
24	(C) Reticence in talking	Darren 3rd ladder	14	8	16	17	36	34	
25	(C) Unprepared	Darren 4th ladder	14	8	16	17	34		
26	(C) Physical protection	Darren 5th ladder	14	8	16	17	26	33	
27	(C) Self sustaining	Darren 6th ladder	14	7	11				
28	(C) Shelter	Darren 7th ladder	2	8	23				
29	(C) Transferring responsibility	Darren 8th ladder	2	8	25				
30	(C) Distrust	Darren 9 ladder	2	8	16	17	36	34	
31	(C) Trust	Darren 10 ladder	2	8	16	17	34		
32	(V) Protection of possesions	Darren 11 ladder	2	8	16	17	26	33	
33	(V) Protection	Darren 12 ladder	2	16	17	36	34		
34	(V) Return to normal	Darren 13 ladder	2	16	17	34			
35	(V) Responsibility to others	Darren 14 ladder	2	16	17	26	33		
36	(V) Survival	Darren 15 ladder	2	17	36	34			
37	(V) Peace of mind	Darren 16 ladder	2	17	34				
		Darren 17	2	17	26	33			
		Darren 18	1	11					
1	(A) Previous experience								
2	(A) Hazard knowledge								
3	(A) Early warning	Emily 1st ladder	2	1	18	19	21	35	
4	(A) Shared experiences	Emily 2nd ladder	2	1	18	19	33		
5	(A) Ease of preparing	Emily 3rd ladder	2	11	8				
6	(A) Belief in preparing	Emily 4th ladder	2	18	19	21	35		
7	(A) Relevance	Emily 5th ladder	2	18	19	33			
8	(A) Salience	Emily 6th ladder	2	19	21	35			
9	(A) Receptive to ideas	Emily 7th ladder	2	19	33				
10	(A) Individual responsibility	Emily 8 ladder	2	17	19	21	35		
11	(A) Sources of information	Emily 9 ladder	2	17	19	33			
12	(A) Fatalism	Emily 10 ladder	2	17	27	36			
13	(A) Inconvenience	Emily 11 ladder	2	6	17	19	21	35	
14	(A) Influence of others	Emily 12 ladder	2	6	17	19	33		
15	(A) Reticence	Emily 13 ladder	2	6	17	27	36		
16	(A) Awareness of preparing	Emily 14 ladder	2	6	19	21	35		
17	(A) Active preparing	Emily 15 ladder	2	6	19	33			
18	(C) Thinking about issues	Emily 16 ladder	2	6	36				
19	(C) Discussing issues								

21 (C) Community Involvement	Harold 1st ladder	1	2	6	26	31	29	
22 (C) Uncertainty	Harold 2nd ladder	1	2	26	31	29		
23 (C) Lack of motivation	Harold 3rd ladder	1	29					
24 (C) Reticence in talking	Harold 4th ladder	1	20	24				
25 (C) Unprepared	Harold 5th ladder	5	26	31	29			
26 (C) Physical protection	Harold 6th ladder	5	6	26	31	29		
27 (C) Self sustaining	Harold 7 ladder	7	26	31	29			
28 (C) Shelter	Harold 8 ladder	7	11	26	31	29		
29 (C) Transferring responsibility	Harold 9 ladder	7	31	29				
30 (C) Distrust								
31 (C) Trust	Heather 1st ladder	7	11	8	21	35		
32 (V) Protection of possesions	Heather 2nd ladder	7	11	8	21	33	37	
33 (V) Protection	Heather 3rd ladder	7	11	8	21	27	36	
34 (V) Return to normal	Heather 4th ladder	7	11	19	18			
35 (V) Responsibility to others	Heather 5th ladder	7	11	8	18			
36 (V) Survival	Heather 6th ladder	1	6	17	21	35		
37 (V) Peace of mind	Heather 7th ladder	1	6	17	21	33	37	
	Heather 8th ladder	1	6	17	21	27	36	
	Heather 9th ladder	1	6	17	27	36		
1 (A) Previous experience	Heather 10th ladder	1	6	17	26	27	36	
2 (A) Hazard knowledge	Heather 11th ladder	1	6	18				
3 (A) Early warning	Heather 12th ladder	1	18					
4 (A) Shared experiences	Heather 13th ladder	2	6	17	21	35		
5 (A) Ease of preparing	Heather 14th ladder	2	6	17	21	33	37	
6 (A) Belief in preparing	Heather 15th ladder	2	6	17	21	27	36	
7 (A) Relevance	Heather 16th ladder	2	6	17	27	36		
8 (A) Salience	Heather 17th ladder	2	6	17	26	27	36	
9 (A) Receptive to ideas	Heather 18th ladder	2	6	18				
10 (A) Individual responsibility	Heather 19th ladder	2	17	21	35			
11 (A) Sources of information	Heather 20 ladder	2	17	21	33	37		
12 (A) Fatalism	Heather 21 ladder	2	17	21	27	36		
13 (A) Inconvenience	Heather 22 ladder	2	17	27	36			
14 (A) Influence of others	Heather 23 ladder	2	17	26	27	36		
15 (A) Reticence	Heather 24 ladder	2	18					
16 (A) Awareness of preparing								
17 (A) Active preparing								
18 (C) Thinking about issues	James 1st ladder	11	8	21	35			
19 (C) Discussing issues	James 2nd ladder	11	8	19	33			
20 (C) Confident	James 3rd ladder	11	17	19	33			
21 (C) Community Involvement	James 4th ladder	11	17	37				
22 (C) Uncertainty	James 5th ladder	11	17	37	33			
23 (C) Lack of motivation	James 6th ladder	11	17	26				
24 (C) Reticence in talking	James 7th ladder	2	17	19	33			
25 (C) Unprepared	James 8th ladder	2	17	37				
26 (C) Physical protection	James 9th ladder	2	17	37	33			
27 (C) Self sustaining	James 10th ladder	2	17	26				
28 (C) Shelter	James 11th ladder	1	17	19	33			
29 (C) Transferring responsibility	James 12th ladder	1	17	37				
30 (C) Distrust	James 13 ladder	1	17	37	33			
31 (C) Trust	James 14 ladder	1	17	26				
32 (V) Protection of possesions	James 15 ladder	20	21	35				
33 (V) Protection	James 16 ladder	20	36					
34 (V) Return to normal								
35 (V) Responsibility to others								
36 (V) Survival	Joanne 1st ladder	8	23	25				
37 (V) Peace of mind	Joanne 2nd ladder	8	18					
	Joanne 3rdladder	8	17					
	Joanne 4th ladder	8	11	17				
1 (A) Previous experience	Joanne 5th ladder	22	25					
2 (A) Hazard knowledge	Joanne 6th ladder	7	24					
3 (A) Early warning	Joanne 7th ladder	7	17					
4 (A) Shared experiences	Joanne 8th ladder	7	11	17				
5 (A) Ease of preparing	Joanne 9th ladder	14	11	17				
6 (A) Belief in preparing	Joanne 10 ladder	2	17					
7 (A) Relevance	Joanne 11 ladder	2	35	36				
8 (A) Salience								
9 (A) Receptive to ideas								
10 (A) Individual responsibility	Lisa 1st ladder	7	11	17				
11 (A) Sources of information	Lisa 2nd ladder	14	17					
12 (A) Fatalism	Lisa 3rd ladder	14	19	25				
13 (A) Inconvenience	Lisa 4th ladder	14	18	25				
14 (A) Influence of others	Lisa 5th ladder	14	13	25				
15 (A) Reticence	Lisa 6th ladder	14	13	5	25			
16 (A) Awareness of preparing	Lisa 7th ladder	2	17					
17 (A) Active preparing	Lisa 8th ladder	2	13	25				
18 (C) Thinking about issues	Lisa 9th ladder	2	13	5	25			
19 (C) Discussing issues	Lisa 10th ladder	2	28	32				
20 (C) Confident	Lisa 11th ladder	2	28	33				
21 (C) Community Involvement	Lisa 12th ladder	2	12	25				
22 (C) Uncertainty	Lisa 13th ladder	1	12	25				
23 (C) Lack of motivation	Lisa 14th ladder	8	24					
24 (C) Reticence in talking								
25 (C) Unprepared								
26 (C) Physical protection	Mary 1st ladder	7	30					
27 (C) Self sustaining	Mary 2nd ladder	7	21	35				
28 (C) Shelter	Mary 3rd ladder	7	21	33				
29 (C) Transferring responsibility	Mary 4th ladder	7	21	18				
30 (C) Distrust	Mary 5th ladder	7	18	21	35			
31 (C) Trust	Mary 6th ladder	7	18	21	33			
32 (V) Protection of possesions	Mary 7th ladder	7	11	16	33			
33 (V) Protection	Mary 8	7	11	16	25			
34 (V) Return to normal	Mary 9	4	11	16	33			
35 (V) Responsibility to others	Mary 10	4	11	16	25			
36 (V) Survival								
37 (V) Peace of mind								

	Matthew 1st ladder	8	16	23			
	Matthew 2nd ladder	8	24				
1 (A) Previous experience	Matthew 3rd ladder	8	18				
2 (A) Hazard knowledge	Matthew 4th ladder	8	11	18			
3 (A) Early warning	Matthew 5th ladder	8	11	19	17		
4 (A) Shared experiences	Matthew 6th ladder	8	19	17			
5 (A) Ease of preparing	Matthew 7th ladder	8	6	17	19		
6 (A) Belief in preparing	Matthew 8	2	6	17	19		
7 (A) Relevance							
8 (A) Salience	Michael 1 ladder	7	31				
9 (A) Receptive to ideas	Michael 2 ladder	1	11	17	27		
10 (A) Individual responsibility	Michael 3 ladder	1	11	17	33		
11 (A) Sources of information	Michael 4 ladder	1	11	17	21	35	
12 (A) Fatalism	Michael 5 ladder	1	11	17	21	20	
13 (A) Inconvenience	Michael 6 ladder	1	17	27			
14 (A) Influence of others	Michael 7 ladder	1	17	33			
15 (A) Reticence	Michael 8 ladder	1	17	21	35		
16 (A) Awareness of preparing	Michael 9 ladder	1	17	21	20		
17 (A) Active preparing	Michael 10 ladder	2	8	17	27		
18 (C) Thinking about issues	Michael 11 ladder	2	8	17	33		
19 (C) Discussing issues	Michael 12 ladder	2	8	17	21	35	
20 (C) Confident	Michael 13 ladder	2	8	17	21	20	
21 (C) Community Involvement	Michael 14 ladder	2	8	21	35		
22 (C) Uncertainty	Michael 15 ladder	2	8	21	20		
23 (C) Lack of motivation	Michael 16 ladder	2	8	19			
24 (C) Reticence in talking	Michael 17 ladder	2	17	27			
25 (C) Unprepared	Michael 18 ladder	2	17	33			
26 (C) Physical protection	Michael 19 ladder	2	17	21	35		
27 (C) Self sustaining	Michael 20 ladder	2	17	21	20		
28 (C) Shelter	Michael 21 ladder	10	17	27			
29 (C) Transferring responsibility	Michael 22 ladder	10	17	33			
30 (C) Distrust	Michael 23 ladder	10	17	21	35		
31 (C) Trust	Michael 24 ladder	10	17	21	20		
32 (V) Protection of possesions	Michael 25 ladder	10	21	35			
33 (V) Protection	Michael 26 ladder	10	21	20			
34 (V) Return to normal							
35 (V) Responsibility to others	Robert 1st ladder	2	33				
36 (V) Survival	Robert 2nd ladder	2	32	37			
37 (V) Peace of mind	Robert 3rd ladder	2	28	37			
	Robert 4th ladder	2	17	33			
	Robert 5 ladder	2	17	32	37		
1 (A) Previous experience	Robert 6 ladder	2	17	28	37		
2 (A) Hazard knowledge	Robert 7 ladder	6	17	33			
3 (A) Early warning	Robert 8 ladder	6	17	32	37		
4 (A) Shared experiences	Robert 9 ladder	6	17	28	37		
5 (A) Ease of preparing	Robert 10 ladder	7	11	17	33		
6 (A) Belief in preparing	Robert 11 ladder	7	11	17	32	37	
7 (A) Relevance	Robert 12 ladder	7	11	17	28	37	
8 (A) Salience	Robert 13 ladder	7	11	30			
9 (A) Receptive to ideas	Robert 14 ladder	7	30				
10 (A) Individual responsibility	Robert 15 ladder	7	31				
11 (A) Sources of information							
12 (A) Fatalism							
13 (A) Inconvenience	Tanya 1st ladder	10	15	23			
14 (A) Influence of others	Tanya 2nd ladder	10	15	21			
15 (A) Reticence	Tanya 3rd ladder	10	21				
16 (A) Awareness of preparing	Tanya 4th ladder	2	26				
17 (A) Active preparing	Tanya 5th ladder	2	8	23			
18 (C) Thinking about issues	Tanya 6th ladder	2	8	26			
19 (C) Discussing issues	Tanya 7th ladder	2	8	19			
20 (C) Confident	Tanya 8th ladder	2	8	30	24		
21 (C) Community Involvement	Tanya 9th ladder	2	8	31			
22 (C) Uncertainty	Tanya 10th ladder	2	4				
23 (C) Lack of motivation	Tanya 11th ladder	7	11	8	23		
24 (C) Reticence in talking	Tanya 12th ladder	7	11	8	26		
25 (C) Unprepared	Tanya 13 ladder	7	11	8	19		
26 (C) Physical protection	Tanya 14 ladder	7	11	8	30	24	
27 (C) Self sustaining	Tanya 15 ladder	7	11	8	31		
28 (C) Shelter	Tanya 16 ladder	7	11	18	22	30	24
29 (C) Transferring responsibility	Tanya 17 ladder	7	11	17	32	36	37
30 (C) Distrust	Tanya 18 ladder	7	11	17	32	37	
31 (C) Trust	Tanya 19 ladder	7	30	24			
32 (V) Protection of possesions	Tanya 20 ladder	7	31				
33 (V) Protection	Tanya 21 ladder	1	11	8	23		
34 (V) Return to normal	Tanya 22 ladder	1	11	8	26		
35 (V) Responsibility to others	Tanya 23 ladder	1	11	8	19		
36 (V) Survival	Tanya 24 ladder	1	11	8	30	24	
37 (V) Peace of mind	Tanya 25 ladder	1	11	8	31		
	Tanya 26 ladder	1	11	18	22	30	24
	Tanya 27 ladder	1	11	17	32	36	37
	Tanya 28 ladder	1	11	17	32	37	
	Tanya 29 ladder	1	17	32	36	37	
	Tanya 30 ladder	1	17	32	37		
	Tanya 31 ladder	3	17	32	36	37	
	Tanya 32 ladder	3	17	32	37		

Benalla Raw ladder data for Means-End Chain and Hierarchical Value Maps

1	(A) Previous experience	Amanda 1 ladder	2	25			
2	(A) Hazard knowledge	Amanda 2 ladder	2	18	25		
3	(A) Early warning	Amanda 3 ladder	2	7	24		
4	(A) Shared experiences	Amanda 4 ladder	2	7	22		
5	(A) Ease of preparing	Amanda 5 ladder	2	7	30		
6	(A) Belief in preparing	Amanda 6 ladder	2	7	11		
7	(A) Relevance	Amanda 7 ladder	2	7	21		
8	(A) Salience	Amanda 8 ladder	2	8	11		
9	(A) Receptive to ideas	Amanda 9 ladder	2	8	18	25	
10	(A) Individual responsibility	Amanda 10 ladder	2	8	25		
11	(A) Sources of information	Amanda 11 ladder	2	8	24		
12	(A) Fatalism	Amanda 12 ladder	14	8	18	25	
13	(A) Inconvenience	Amanda 13 ladder	14	8	25		
14	(A) Influence of others	Amanda 14 ladder	14	8	24		
15	(A) Reticence	Amanda 15 ladder	14	8	11		
16	(A) Awareness of preparing	Amanda 16 ladder	14	24			
17	(A) Active preparing	Amanda 17 ladder	14	7	24		
18	(C) Thinking about issues	Amanda 18 ladder	14	7	22		
19	(C) Discussing issues	Amanda 19 ladder	14	7	30		
20	(C) Confident	Amanda 20 ladder	14	7	11		
21	(C) Community Involvement	Amanda 21 ladder	14	7	21		
22	(C) Uncertainty	Amanda 22 ladder	15	22			
23	(C) Lack of motivation	Amanda 23 ladder	3	22			
24	(C) Reticence in talking	24	3	30			
25	(C) Unprepared	25	23	30			
26	(C) Physical protection	26	16	21			
27	(C) Self sustaining	27	10	21			
28	(C) Shelter						
29	(C) Transferring responsibility						
30	(C) Distrust	Chris 1 ladder	11	26			
31	(C) Trust	Chris 2 ladder	1	26			
32	(V) Protection of possesions	Chris 3 ladder	1	17			
33	(V) Protection	Chris 4 ladder	1	22	30		
34	(V) Return to normal	Chris 5 ladder	1	22	31		
35	(V) Responsibility to others	Chris 6 ladder	1	8	22	30	
36	(V) Survival	Chris 7 ladder	1	8	22	31	
37	(V) Peace of mind	Chris 8 ladder	1	8	24		
		Chris 9 ladder	1	8	19	18	
		Chris 10 ladder	1	8	19	31	
1	(A) Previous experience	Chris 11 ladder	1	24			
2	(A) Hazard knowledge	Chris 12 ladder	1	18			
3	(A) Early warning	Chris 13 ladder	1	7	30		
4	(A) Shared experiences	Chris 14 ladder	1	7	11		
5	(A) Ease of preparing	Chris 15 ladder	1	7	18		
6	(A) Belief in preparing	Chris 16 ladder	1	7	22	30	
7	(A) Relevance	Chris 17 ladder	1	7	22	31	
8	(A) Salience	Chris 18 ladder	2	8	22	30	
9	(A) Receptive to ideas	Chris 19 ladder	2	8	22	31	
10	(A) Individual responsibility	Chris 20 ladder	2	8	24		
11	(A) Sources of information	Chris 21 ladder	2	8	19	18	
12	(A) Fatalism	Chris 22 ladder	2	8	19	31	
13	(A) Inconvenience	Chris 23 ladder	2	18			
14	(A) Influence of others	Chris 24 ladder	2	19	18		
15	(A) Reticence	Chris 25 ladder	2	19	31		
16	(A) Awareness of preparing	Chris 26 ladder	2	7	30		
17	(A) Active preparing	Chris 27 ladder	2	7	11		
18	(C) Thinking about issues	Chris 28 ladder	2	7	18		
19	(C) Discussing issues	Chris 29 ladder	2	7	22	30	
20	(C) Confident	Chris 30 ladder	2	7	22	31	
21	(C) Community Involvement	31	14	19	18		
22	(C) Uncertainty	32	14	19	31		
23	(C) Lack of motivation	33	3	30			
24	(C) Reticence in talking						
25	(C) Unprepared						
26	(C) Physical protection	Darryl 1 ladder	1	12			
27	(C) Self sustaining	Darryl 2 ladder	1	26	20	24	
28	(C) Shelter	Darryl 3 ladder	1	26	20	15	
29	(C) Transferring responsibility	Darryl 4 ladder	1	17	20	24	
30	(C) Distrust	Darryl 5 ladder	1	17	20	15	
31	(C) Trust	Darryl 6 ladder	1	18			
32	(V) Protection of possesions	Darryl 7 ladder	1	22			
33	(V) Protection	Darryl 8 ladder	1	20	24		
34	(V) Return to normal	Darryl 9 ladder	1	20	15		
35	(V) Responsibility to others	Darryl 10 ladder	1	6	35	37	
36	(V) Survival	Darryl 11 ladder	1	6	37		
37	(V) Peace of mind	Darryl 12 ladder	2	8	23		
		Darryl 13 ladder	2	8	20	24	
		Darryl 14 ladder	2	8	20	15	
1	(A) Previous experience	Darryl 15 ladder	2	8	19	35	37
2	(A) Hazard knowledge	Darryl 16 ladder	2	8	19	37	
3	(A) Early warning	Darryl 17 ladder	4	19	35	37	
4	(A) Shared experiences	Darryl 18 ladder	4	19	37		
5	(A) Ease of preparing	Darryl 19 ladder	14	7	31		
6	(A) Belief in preparing	Darryl 20 ladder	14	7	19	35	37
7	(A) Relevance	Darryl 21 ladder	14	7	19	37	
8	(A) Salience	Darryl 22 ladder	3	20	24		
9	(A) Receptive to ideas	Darryl 23 ladder	3	20	15		
10	(A) Individual responsibility	Darryl 24 ladder	3	17			
11	(A) Sources of information	Darryl 25 ladder	10	17			
12	(A) Fatalism	Darryl 26 ladder	10	11	17		
13	(A) Inconvenience						

15	(A) Reticence	Helen 1st ladder	1	7	11			
16	(A) Awareness of preparing	Helen 2nd ladder	1	7	30			
17	(A) Active preparing	Helen 3rd ladder	1	7	31			
18	(C) Thinking about issues	Helen 4th ladder	1	7	17			
19	(C) Discussing issues	Helen 5th ladder	1	31				
20	(C) Confident	Helen 6th ladder	1	17				
21	(C) Community Involvement	Helen 7th ladder	1	3	17			
22	(C) Uncertainty	Helen 8th ladder	1	3	30			
23	(C) Lack of motivation	Helen 9th ladder	1	12				
24	(C) Reticence in talking	Helen 10th ladder	9	30				
25	(C) Unprepared	Helen 11st ladder	4	24				
26	(C) Physical protection	Helen 12th ladder	8	11				
27	(C) Self sustaining	Helen 13th ladder	8	17				
28	(C) Shelter	Helen 14th ladder	13	17				
29	(C) Transferring responsibility	Helen 15 ladder	13	12				
30	(C) Distrust	Helen 16 ladder	15	12				
31	(C) Trust	Helen 17 ladder	2	12				
32	(V) Protection of possesions							
33	(V) Protection							
34	(V) Return to normal	Joan 1 ladder	8	7	30			
35	(V) Responsibility to others	Joan 2 ladder	8	24				
36	(V) Survival	Joan 3 ladder	1	4	24			
37	(V) Peace of mind	Joan 4 ladder	1	18				
		Joan 5 ladder	1	3	17	32		
		Joan 6 ladder	1	22				
1	(A) Previous experience	Joan 7 ladder	1	26				
2	(A) Hazard knowledge	Joan 8 ladder	2	26				
3	(A) Early warning	Joan 9 ladder	2	22				
4	(A) Shared experiences							
5	(A) Ease of preparing							
6	(A) Belief in preparing	John 1 ladder	8	30				
7	(A) Relevance	John 2 ladder	1	2	7	30		
8	(A) Salience	John 3 ladder	1	2	7	31		
9	(A) Receptive to ideas	John 4 ladder	1	2	7	29		
10	(A) Individual responsibility	John 5 ladder	1	29				
11	(A) Sources of information	John 6 ladder	1	21	35			
12	(A) Fatalism	John 7 ladder	15	24				
13	(A) Inconvenience							
14	(A) Influence of others							
15	(A) Reticence	Julia 1 ladder	1	8	18			
16	(A) Awareness of preparing	Julia 2 ladder	1	8	24			
17	(A) Active preparing	Julia 3 ladder	1	8	31			
18	(C) Thinking about issues	Julia 4 ladder	1	8	22	25		
19	(C) Discussing issues	Julia 5 ladder	1	8	22	23	25	
20	(C) Confident	Julia 6 ladder	1	8	16	11		
21	(C) Community Involvement	Julia 7 ladder	1	8	21	25		
22	(C) Uncertainty	Julia 8 ladder	2	8	18			
23	(C) Lack of motivation	Julia 9 ladder	2	8	24			
24	(C) Reticence in talking	Julia 10 ladder	2	8	31			
25	(C) Unprepared	Julia 11 ladder	2	8	22	25		
26	(C) Physical protection	Julia 12 ladder	2	8	22	23	25	
27	(C) Self sustaining	Julia 13 ladder	2	8	16	11		
28	(C) Shelter	Julia 14 ladder	2	8	21	25		
29	(C) Transferring responsibility	Julia 15 ladder	2	28	33			
30	(C) Distrust	Julia 16 ladder	2	28	37			
31	(C) Trust	Julia 17 ladder	2	25				
32	(V) Protection of possesions	Julia 18 ladder	2	22	25			
33	(V) Protection	Julia 19 ladder	2	22	23	25		
34	(V) Return to normal	Julia 20 ladder	2	16	11			
35	(V) Responsibility to others	Julia 21 ladder	7	24				
36	(V) Survival	Julia 22 ladder	7	31				
37	(V) Peace of mind	Julia 23 ladder	7	22	25			
		Julia 24 ladder	7	22	23	25		
		Julia 25 ladder	7	11				
1	(A) Previous experience	Julia 26 ladder	5	25				
2	(A) Hazard knowledge	Julia 27 ladder	5	21	35			
3	(A) Early warning	Julia 28 ladder	14	21	35			
4	(A) Shared experiences	Julia 29 ladder	13	25				
5	(A) Ease of preparing							
6	(A) Belief in preparing							
7	(A) Relevance	Karen 1 ladder	2	26	28	37		
8	(A) Salience	Karen 2 ladder	2	17	26	28	37	
9	(A) Receptive to ideas	Karen 3 ladder	2	17	32			
10	(A) Individual responsibility	Karen 4 ladder	2	22				
11	(A) Sources of information	Karen 5 ladder	1	12				
12	(A) Fatalism	Karen 6 ladder	1	3	17	26	28	37
13	(A) Inconvenience	Karen 7 ladder	1	3	17	32		
14	(A) Influence of others	Karen 8 ladder	1	17	26	28	37	
15	(A) Reticence	Karen 9 ladder	1	17	32			
16	(A) Awareness of preparing	Karen 10 ladder	1	26	28	37		
17	(A) Active preparing	Karen 11 ladder	1	22				
18	(C) Thinking about issues	Karen 12 ladder	1	18	19	32		
19	(C) Discussing issues	Karen 13 ladder	6	32				
20	(C) Confident	Karen 14 ladder	6	19	32			
21	(C) Community Involvement	Karen 15 ladder	6	8	17	26	28	37
22	(C) Uncertainty	Karen 16 ladder	6	8	17	32		
23	(C) Lack of motivation	Karen 17 ladder	6	8	21			
24	(C) Reticence in talking	Karen 18 ladder	6	8	15	22		
25	(C) Unprepared	Karen 19 ladder	6	19	32			
26	(C) Physical protection	Karen 20 ladder	6	18	19	32		
27	(C) Self sustaining	Karen 21 ladder	7	15	22			
28	(C) Shelter	Karen 22 ladder	7	22				
29	(C) Transferring responsibility							

31	(C) Trust	Kevin 1 ladder	7	31				
32	(V) Protection of possesions	Kevin 2 ladder	7	11	19	21	31	
33	(V) Protection	Kevin 3 ladder	7	11	19	21	35	
34	(V) Return to normal	Kevin 4 ladder	7	11	19	21	32	
35	(V) Responsibility to others	Kevin 5 ladder	7	11	19	35		
36	(V) Survival	Kevin 6 ladder	7	11	19	32		
37	(V) Peace of mind	Kevin 7 ladder	7	11	17	32		
		Kevin 8 ladder	7	19	21	31		
		Kevin 9 ladder	7	19	21	35		
1	(A) Previous experience	Kevin 10 ladder	7	19	21	32		
2	(A) Hazard knowledge	Kevin 11 ladder	7	19	35			
3	(A) Early warning	Kevin 12 ladder	7	19	32			
4	(A) Shared experiences	Kevin 13 ladder	7	19	17	32		
5	(A) Ease of preparing	Kevin 14 ladder	1	8	21	31		
6	(A) Belief in preparing	Kevin 15 ladder	1	8	21	35		
7	(A) Relevance	Kevin 16 ladder	1	8	21	32		
8	(A) Salience	Kevin 17 ladder	1	8	19	21	31	
9	(A) Receptive to ideas	Kevin 18 ladder	1	8	19	21	35	
10	(A) Individual responsibility	Kevin 19 ladder	1	8	19	21	32	
11	(A) Sources of information	Kevin 20 ladder	1	8	19	35		
12	(A) Fatalism	Kevin 21 ladder	1	8	19	32		
13	(A) Inconvenience	Kevin 22 ladder	1	8	19	17	32	
14	(A) Influence of others	Kevin 23 ladder	1	8	18	32		
15	(A) Reticence	Kevin 24 ladder	1	8	18	26		
16	(A) Awareness of preparing	Kevin 25 ladder	1	19	21	31		
17	(A) Active preparing	Kevin 26 ladder	1	19	21	35		
18	(C) Thinking about issues	Kevin 27 ladder	1	19	21	32		
19	(C) Discussing issues	Kevin 28 ladder	1	19	35			
20	(C) Confident	Kevin 29 ladder	1	19	32			
21	(C) Community Involvement	Kevin 30 ladder	1	19	17	32		
22	(C) Uncertainty	Kevin 31 ladder	1	32				
23	(C) Lack of motivation	Kevin 32 ladder	1	18	32			
24	(C) Reticence in talking	Kevin 33 ladder	1	18	26			
25	(C) Unprepared	Kevin 34 ladder	1	17	32			
26	(C) Physical protection	Kevin 35 ladder	1	3	8	21	31	
27	(C) Self sustaining	Kevin 36 ladder	1	3	8	21	35	
28	(C) Shelter	Kevin 37ladder	1	3	8	21	32	
29	(C) Transferring responsibility	Kevin 38 ladder	1	3	8	19	21	31
30	(C) Distrust	Kevin 39 ladder	1	3	8	19	21	35
31	(C) Trust	Kevin 40 ladder	1	3	8	19	21	32
32	(V) Protection of possesions	Kevin 41 ladder	1	3	8	19	35	
33	(V) Protection	Kevin 42 ladder	1	3	8	19	32	
34	(V) Return to normal	Kevin 43 ladder	1	3	8	19	17	32
35	(V) Responsibility to others	Kevin 44 ladder	1	3	8	18	32	
36	(V) Survival	Kevin 45 ladder	1	3	8	18	26	
37	(V) Peace of mind	Kevin 46 ladder	2	3	8	21	31	
		Kevin 47 ladder	2	3	8	21	35	
		Kevin 48 ladder	2	3	8	21	32	
1	(A) Previous experience	Kevin 49 lladder	2	3	8	19	21	31
2	(A) Hazard knowledge	Kevin 50 ladder	2	3	8	19	21	35
3	(A) Early warning	Kevin 51 ladder	2	3	8	19	21	32
4	(A) Shared experiences	Kevin 52 ladder	2	3	8	19	35	
5	(A) Ease of preparing	Kevin 53 ladder	2	3	8	19	32	
6	(A) Belief in preparing	Kevin 54 ladder	2	3	8	19	17	32
7	(A) Relevance	Kevin 55 ladder	2	3	8	18	32	
8	(A) Salience	Kevin 56 ladder	2	3	8	18	26	
9	(A) Receptive to ideas	Kevin 57 ladder	2	18	32			
10	(A) Individual responsibility	Kevin 58 ladder	2	18	26			
11	(A) Sources of information	Kevin 59 ladder	2	17	32			
12	(A) Fatalism	Kevin 60 ladder	2	26				
13	(A) Inconvenience							

14	(A) Influence of others	Margaret 1 ladder	1	4	15			
15	(A) Reticence	Margaret 2 ladder	1	4	24			
16	(A) Awareness of preparing	Margaret 3 ladder	1	4	21	35		
17	(A) Active preparing	Margaret 4 ladder	1	4	21	19	37	
18	(C) Thinking about issues	Margaret 5 ladder	1	6	17	28	32	
19	(C) Discussing issues	Margaret 6 ladder	1	6	17	32		
20	(C) Confident	Margaret 7 ladder	1	17	28	32		
21	(C) Community Involvement	Margaret 8 ladder	1	17	32			
22	(C) Uncertainty	Margaret 9 ladder	1	19	37			
23	(C) Lack of motivation	Margaret 10 ladder	1	19	21	35		
24	(C) Reticence in talking	Margaret 11 ladder	1	18				
25	(C) Unprepared	Margaret 12 ladder	1	3	30			
26	(C) Physical protection	Margaret 13 ladder	1	3	17	28	32	
27	(C) Self sustaining	Margaret 14 ladder	1	3	17	32		
28	(C) Shelter	Margaret 15 ladder	7	21	35			
29	(C) Transferring responsibility	Margaret 16 ladder	7	21	19	37		
30	(C) Distrust	Margaret 17 ladder	11	17	28	32		
31	(C) Trust	Margaret 18 ladder	11	17	32			
32	(V) Protection of possesions							
33	(V) Protection							
34	(V) Return to normal	Peter 1 ladder	1	8	10	23		
35	(V) Responsibility to others	Peter 2 ladder	1	8	10	21	35	
36	(V) Survival	Peter 3 ladder	1	8	10	5		
37	(V) Peace of mind	Peter 4 ladder	1	8	11			
		Peter 5 ladder	1	12				
		Peter 6 ladder	1	2	31			
1	(A) Previous experience	Peter 7 ladder	1	2	11			
2	(A) Hazard knowledge	Peter 8 ladder	1	2	5	10	21	35
3	(A) Early warning	Peter 9 ladder	1	2	5	10	23	
4	(A) Shared experiences	Peter 10 ladder	1	21	35			
5	(A) Ease of preparing	Peter 11 ladder	1	26				
6	(A) Belief in preparing	Peter 12th ladder	1	18				
7	(A) Relevance	Peter 13th ladder	1	7	21	35		
8	(A) Salience	Peter 14th ladder	1	7	21	30		
9	(A) Receptive to ideas	Peter 15 ladder	1	8	21	35		
10	(A) Individual responsibility	Peter 16 ladder	1	8	19			
11	(A) Sources of information	Peter 17 ladder	1	8	23			
12	(A) Fatalism	18	1	8	16	21	35	
13	(A) Inconvenience	19	1	2	26			
14	(A) Influence of others	20	1	2	7	21	35	
15	(A) Reticence	21	1	2	7	21	30	
16	(A) Awareness of preparing	22	1	2	8	21	35	
17	(A) Active preparing	23	1	2	8	19		
18	(C) Thinking about issues	24	1	2	8	23		
19	(C) Discussing issues	25	1	2	8	16	21	35
20	(C) Confident	26	1	2	16	21	35	
21	(C) Community Involvement	27	15	23				
22	(C) Uncertainty							
23	(C) Lack of motivation							
24	(C) Reticence in talking	Richard 1 ladder	9	30				
25	(C) Unprepared	Richard 2 ladder	9	31				
26	(C) Physical protection	Richard 3 ladder	9	19				
27	(C) Self sustaining	Richard 4 ladder	1	21	35			
28	(C) Shelter	Richard 5 ladder	1	21	37			
29	(C) Transferring responsibility	Richard 6 ladder	4	21	35			
30	(C) Distrust	Richard 7 ladder	4	21	37			
31	(C) Trust	Richard 8 ladder	4	19				
32	(V) Protection of possesions	Richard 9 ladder	1	2	21	35		
33	(V) Protection	Richard 10 ladder	1	2	21	37		
34	(V) Return to normal	Richard 11 ladder	15	19				
35	(V) Responsibility to others	Richard 12 ladder	8	21	35			
36	(V) Survival	Richard 13 ladder	8	21	37			
37	(V) Peace of mind	Richard 14 ladder	8	19				
		Richard 15 ladder	8	18	19			
		Richard 16 ladder	1	2	29			
1	(A) Previous experience	Richard 17 ladder	1	6	17			
2	(A) Hazard knowledge	Richard 18 ladder	1	12	29			
3	(A) Early warning	Richard 19 ladder	1	29				
4	(A) Shared experiences	Richard 20 ladder	1	17	6			
5	(A) Ease of preparing	Richard 21 ladder	1	3	17	6		
6	(A) Belief in preparing	Richard 22 ladder	1	22				
9	(A) Receptive to ideas	Roger 1st ladder	1	2	11			
10	(A) Individual responsibility	Roger 2nd ladder	1	2	8	12	23	
11	(A) Sources of information	Roger 3rd ladder	1	2	8	23		
12	(A) Fatalism	Roger 4th ladder	1	2	8	19		
13	(A) Inconvenience	Roger 5th ladder	1	2	8	18	19	
14	(A) Influence of others	Roger 6th ladder	1	2	8	18	30	
15	(A) Reticence	Roger 7th ladder	1	8	12	23		
16	(A) Awareness of preparing	Roger 8th ladder	1	8	23			
17	(A) Active preparing	Roger 9th ladder	1	8	19			
18	(C) Thinking about issues	Roger 10th ladder	1	8	18	19		
19	(C) Discussing issues	Roger 11th ladder	1	8	18	30		
20	(C) Confident	Roger 12th ladder	1	18	19			
21	(C) Community Involvement	Roger 13th ladder	1	18	30			
22	(C) Uncertainty	Roger 14th ladder	1	30				
23	(C) Lack of motivation	Roger 15th ladder	1	26				
24	(C) Reticence in talking	Roger 16th ladder	7	11				
25	(C) Unprepared	Roger 17th ladder	7	19				
26	(C) Physical protection	Roger 18th ladder	7	30				
27	(C) Self sustaining	Roger 19th ladder	5	25				
28	(C) Shelter	Roger 20th ladder	9	30				
29	(C) Transferring responsibility	Roger 21 ladder	9	21				
30	(C) Distrust	Roger 22 ladder	10	21				
31	(C) Trust	Roger 23 ladder	15	21				
32	(V) Protection of possesions	Roger 24 ladder	4	21				
33	(V) Protection							
34	(V) Return to normal							
35	(V) Responsibility to others	Simon 1 ladder	7	30				
36	(V) Survival	Simon 2 ladder	7	31				
37	(V) Peace of mind	Simon 3 ladder	7	3	17			
		Simon 4 ladder	9	30				
		Simon 5 ladder	9	31				
1	(A) Previous experience	Simon 6 ladder	2	3	17			
2	(A) Hazard knowledge	Simon 7 ladder	14	3	17			
3	(A) Early warning	Simon 8 ladder	1	6	17			
4	(A) Shared experiences	Simon 9 ladder	1	19	35			
5	(A) Ease of preparing	Simon 10 ladder	1	19	37			
6	(A) Belief in preparing	Simon 11 ladder	1	19	32			
7	(A) Relevance	Simon 12 ladder	1	18				
8	(A) Salience	Simon 13 ladder	10	21	35			
9	(A) Receptive to ideas	Simon 14 ladder	10	35				
10	(A) Individual responsibility							
11	(A) Sources of information							
12	(A) Fatalism	Tony 1 ladder	24	29				
13	(A) Inconvenience	Tony 2 ladder	7	31				
14	(A) Influence of others	Tony 3 ladder	22	21	11			
15	(A) Reticence	Tony 4 ladder	22	21	17			
16	(A) Awareness of preparing	Tony 5 ladder	14	21	11			
17	(A) Active preparing	Tony 6 ladder	14	21	17			
18	(C) Thinking about issues	Tony 7 ladder	1	19	21	11		
19	(C) Discussing issues	Tony 8 ladder	1	19	21	17		
20	(C) Confident	Tony 9 ladder	1	19	35			
21	(C) Community Involvement	Tony 10 ladder	1	19	37			
22	(C) Uncertainty	Tony 11 ladder	10	21	11			
23	(C) Lack of motivation	Tony 12 ladder	10	21	17			
24	(C) Reticence in talking	Tony 13 ladder	1	25				
25	(C) Unprepared	Tony 14 ladder	1	17	21	11		
26	(C) Physical protection	Tony 15 ladder	8	25				
27	(C) Self sustaining	Tony 16 ladder	8	3	21	11		
28	(C) Shelter	Tony 17 ladder	8	3	21	17		
29	(C) Transferring responsibility	Tony 18 ladder	8	3	17	21	11	
30	(C) Distrust	Tony 19 ladder	11	21	17			
31	(C) Trust							

Invermay Raw ladder data for Means-End Chain and Hierarchical Value Maps

1	(A) Previous experience	Brian 1	2	8	15	23
2	(A) Hazard knowledge	Brian 2	2	8	23	
3	(A) Early warning	Brian 3	2	8	24	
4	(A) Shared experiences	Brian 4	2	8	25	
5	(A) Ease of preparing	Brian 5	2	8	18	21
6	(A) Belief in preparing	Brian 6	2	8	18	31
7	(A) Relevance	Brian 7	2	11	18	21
8	(A) Salience	Brian 8	2	11	18	31
9	(A) Receptive to ideas	Brian 9	2	18	21	
10	(A) Individual responsibility	Brian 10	2	18	31	
11	(A) Sources of information	Brian 11	7	31		
12	(A) Fatalism	Brian 12	7	11	18	31
13	(A) Inconvenience	Brain 13	7	11	18	21
14	(A) Influence of others					
15	(A) Reticence					
16	(A) Awareness of preparing	Cara 1	2	36		
17	(A) Active preparing	Cara 2	2	18	19	37
18	(C) Thinking about issues	Cara 3	2	18	19	35
19	(C) Discussing issues	Cara 4	2	18	22	
20	(C) Confident	Cara 5	14	16	27	32
21	(C) Community Involvement	Cara 6	14	16	27	33
22	(C) Uncertainty	Cara 7	14	16	27	37
23	(C) Lack of motivation	Cara 8	14	18	19	37
24	(C) Reticence in talking	Cara 9	14	18	19	35
25	(C) Unprepared	Cara 10	14	18	22	
26	(C) Physical protection	Cara 11	14	19	37	
27	(C) Self sustaining	Cara 12	14	19	35	
28	(C) Shelter	Cara 13	14	8	11	
29	(C) Transferring responsibility	Cara 14	14	8	21	
30	(C) Distrust	Cara 15	14	8	19	37
31	(C) Trust	Cara 16	14	8	19	35
32	(V) Protection of possesions	Cara 17	14	8	22	
33	(V) Protection	Cara 18	5	11		
34	(V) Return to normal	Cara 19	7	11		
35	(V) Responsibility to others	Cara 20	7	19	37	
36	(V) Survival	Cara 21	7	19	35	
37	(V) Peace of mind	Cara 22	7	37		

1	(A) Previous experience	Carol 1	2	12	25	
2	(A) Hazard knowledge	Carol 2	2	25		
3	(A) Early warning	Carol 3	2	7	30	
4	(A) Shared experiences	Carol 4	2	7	31	
5	(A) Ease of preparing	Carol 5	2	7	25	
6	(A) Belief in preparing	Carol 6	2	7	15	23
7	(A) Relevance	Carol 7	2	8	30	
8	(A) Salience	Carol 8	2	8	15	23
9	(A) Receptive to ideas	Carol 9	2	8	19	
10	(A) Individual responsibility	Carol 10	2	18	33	
11	(A) Sources of information	Carol 11	2	18	32	
12	(A) Fatalism	Carol 12	13	25		
13	(A) Inconvenience	Carol 13	5	25		
14	(A) Influence of others	Carol 14	5	11		
15	(A) Reticence	Carol 15	4	19		
16	(A) Awareness of preparing	Carol 16	23	15		
17	(A) Active preparing					
18	(C) Thinking about issues					
19	(C) Discussing issues	Grant 1	2	8	22	
20	(C) Confident	Grant 2	2	8	19	37
21	(C) Community Involvement	Grant 3	2	8	15	
22	(C) Uncertainty	Grant 4	2	8	4	15
23	(C) Lack of motivation	Grant 5	2	7	15	
24	(C) Reticence in talking	Grant 6	2	7	31	
25	(C) Unprepared	Grant 7	2	7	30	
26	(C) Physical protection	Grant 8	2	7	25	
27	(C) Self sustaining	Grant 9	1	17	27	
28	(C) Shelter	Grant 10	1	8	22	
29	(C) Transferring responsibility	Grant 11	1	8	19	37
30	(C) Distrust	Grant 12	1	8	15	
31	(C) Trust	Grant 13	1	8	4	15
32	(V) Protection of possesions	Grant 14	1	7	15	
33	(V) Protection	Grant 15	1	7	31	
34	(V) Return to normal	Grant 16	1	7	30	
35	(V) Responsibility to others	Grant 17	1	7	25	
36	(V) Survival					

		Greg 1	1	18				
		Greg 2	1	19				
1	(A) Previous experience	Greg 3	1	9	15			
2	(A) Hazard knowledge	Greg 4	1	9	25			
3	(A) Early warning	Greg 5	1	9	30	25		
4	(A) Shared experiences	Greg 6	1	7	15			
5	(A) Ease of preparing	Greg 7	1	7	30	25		
6	(A) Belief in preparing	Greg 8	1	7	31			
7	(A) Relevance	Greg 9	8	19				
8	(A) Salience	Greg 10	2	18				
9	(A) Receptive to ideas	Greg 11	2	19				
10	(A) Individual responsibility	Greg 12	2	7	15			
11	(A) Sources of information	Greg 13	2	7	30	25		
12	(A) Fatalism	Greg 14	2	7	31			
13	(A) Inconvenience	Greg 15	13	25				
14	(A) Influence of others							
15	(A) Reticence							
16	(A) Awareness of preparing	Ian 1	14	8				
17	(A) Active preparing	Ian 2	11	8				
18	(C) Thinking about issues	Ian 3	7	30				
19	(C) Discussing issues	Ian 4	7	31				
20	(C) Confident	Ian 5	7	21				
21	(C) Community Involvement	Ian 6	4	21				
22	(C) Uncertainty	Ian 7	2	18	19	21		
23	(C) Lack of motivation	Ian 8	2	18	19	35		
24	(C) Reticence in talking	Ian 9	2	26				
25	(C) Unprepared	Ian 10	2	17	26			
26	(C) Physical protection	Ian 11	2	17	33			
27	(C) Self sustaining							
28	(C) Shelter							
29	(C) Transferring responsibility	Josh 1	2	7	11	8	16	
30	(C) Distrust	Josh 2	2	7	11	8	24	
31	(C) Trust	Josh 3	2	7	11	8	15	
32	(V) Protection of possesions	Josh 4	2	7	11	8	13	25
33	(V) Protection	Josh 5	2	7	11	8	31	25
34	(V) Return to normal	Josh 6	2	7	11	8	31	29
35	(V) Responsibility to others	Josh 7	2	7	11	8	25	
36	(V) Survival	Josh 8	2	7	15			
37	(V) Peace of mind	Josh 9	2	7	31	25		
		Josh 10	2	7	31	29	25	
		Josh 11	9	31	25			
1	(A) Previous experience	Josh 12	9	31	29	25		
2	(A) Hazard knowledge							
3	(A) Early warning							
4	(A) Shared experiences	Kate 1	4	24				
5	(A) Ease of preparing	Kate 2	4	21				
6	(A) Belief in preparing	Kate 3	4	35				
7	(A) Relevance	Kate 4	4	19	18			
8	(A) Salience	Kate 5	9	21				
9	(A) Receptive to ideas	Kate 6	9	15				
10	(A) Individual responsibility	Kate 7	9	30				
11	(A) Sources of information	Kate 8	9	35				
12	(A) Fatalism	Kate 9	7	30				
13	(A) Inconvenience	Kate 10	7	11				
14	(A) Influence of others	Kate 11	14	2	18			
15	(A) Reticence	Kate 12	14	2	8	19	18	
16	(A) Awareness of preparing	Kate 13	14	2	8	22	18	
17	(A) Active preparing	Kate 14	14	2	8	22	25	
18	(C) Thinking about issues	Kate 15	14	2	8	25		
19	(C) Discussing issues	Kate 16	14	2	8	12	25	
20	(C) Confident	Kate 17	14	8	19	18		
21	(C) Community Involvement	Kate 18	14	8	22	18		
22	(C) Uncertainty	Kate 19	14	8	22	25		
23	(C) Lack of motivation	Kate 20	14	8	25			
24	(C) Reticence in talking	Kate 21	14	8	12	25		
25	(C) Unprepared	Kate 22	14	25				
26	(C) Physical protection	Kate 23	13	25				
27	(C) Self sustaining							
28	(C) Shelter							

29	(C) Transferring responsibility	Leon 1	2	12			
30	(C) Distrust	Leon 2	2	18			
31	(C) Trust	Leon 3	2	26			
32	(V) Protection of possesions	Leon 4	2	8	31		
33	(V) Protection	Leon 5	2	8	24		
34	(V) Return to normal	Leon 6	2	19			
35	(V) Responsibility to others	Leon 7	22	25			
36	(V) Survival	Leon 8	4	21			
37	(V) Peace of mind	Leon 9	2	7	21		
		Leon 10	2	7	31		
		Leon 11	2	7	30		
1	(A) Previous experience	Leon 12	9	30			
2	(A) Hazard knowledge						
3	(A) Early warning						
4	(A) Shared experiences	Martin 1	11	2	16		
5	(A) Ease of preparing	Martin 2	11	2	26	36	
6	(A) Belief in preparing	Martin 3	11	2	19	21	35
7	(A) Relevance	Martin 4	11	2	25		
8	(A) Salience	Martin 5	14	2	16		
9	(A) Receptive to ideas	Martin 6	14	2	26	36	
10	(A) Individual responsibility	Martin 7	14	2	19	21	35
11	(A) Sources of information	Martin 8	14	2	25		
12	(A) Fatalism	Martin 9	14	26	36		
13	(A) Inconvenience	Martin 10	14	25			
14	(A) Influence of others	Martin 11	1	2	16		
15	(A) Reticence	Martin 12	1	2	26	36	
16	(A) Awareness of preparing	Martin 13	1	2	19	21	35
17	(A) Active preparing	Martin 14	1	2	25		
18	(C) Thinking about issues	Martin 15	1	26	36		
19	(C) Discussing issues	Martin 16	1	8	25		
20	(C) Confident	Martin 17	4	25			
21	(C) Community Involvement	Martin 18	4	15			
22	(C) Uncertainty	Martin 19	4	31			
23	(C) Lack of motivation	Martin 20	7	19	21	35	
24	(C) Reticence in talking	Martin 21	7	15			
25	(C) Unprepared	Martin 22	7	31			
26	(C) Physical protection						
27	(C) Self sustaining						
28	(C) Shelter	Paul 1	14	19	7	30	
29	(C) Transferring responsibility	Paul 2	14	19	2	8	31
30	(C) Distrust	Paul 3	14	19	2	8	30
31	(C) Trust	Paul 4	14	19	2	8	18
32	(V) Protection of possesions	Paul 5	14	19	2	8	15
33	(V) Protection	Paul 6	14	19	2	8	23
34	(V) Return to normal	Paul 7	14	19	2	8	22
35	(V) Responsibility to others	Paul 8	14	19	2	8	25
36	(V) Survival	Paul 9	14	19	2	8	16
37	(V) Peace of mind	Paul 10	11	8	31		
		Paul 11	11	8	30		
		Paul 12	11	8	18		
1	(A) Previous experience	Paul 13	11	8	15		
2	(A) Hazard knowledge	Paul 14	11	8	23		
3	(A) Early warning	Paul 15	11	8	22		
4	(A) Shared experiences	Paul 16	11	8	25		
5	(A) Ease of preparing	Paul 17	11	8	16		
6	(A) Belief in preparing	Paul 18	11	16			
7	(A) Relevance	Paul 19	4	15			
8	(A) Salience	Paul 20	4	25			
9	(A) Receptive to ideas	Paul 21	13	25			
10	(A) Individual responsibility						
12	(A) Fatalism	Phillip 1	17	6			
13	(A) Inconvenience	Phillip 2	6	17	27	35	
14	(A) Influence of others	Phillip 3	6	17	32		
15	(A) Reticence	Phillip 4	6	17	37		
16	(A) Awareness of preparing	Phillip 5	6	17	28	37	
17	(A) Active preparing	Phillip 6	6	17	28	33	
18	(C) Thinking about issues	Phillip 7	3	17	27	35	
19	(C) Discussing issues	Phillip 8	3	17	32		
20	(C) Confident	Phillip 9	3	17	37		
21	(C) Community Involvement	Phillip 10	3	17	28	37	
22	(C) Uncertainty	Phillip 11	3	17	28	33	
23	(C) Lack of motivation	Phillip 12	2	17	27	35	
24	(C) Reticence in talking	Phillip 13	2	17	32		
25	(C) Unprepared	Phillip 14	2	17	37		
26	(C) Physical protection	Phillip 15	2	17	28	37	
27	(C) Self sustaining	Phillip 16	2	17	28	33	
28	(C) Shelter	Phillip 17	2	19	35		
29	(C) Transferring responsibility	Phillip 18	2	19	37		
30	(C) Distrust	Phillip 19	2	19	26	28	37
31	(C) Trust	Phillip 20	2	19	26	28	33
32	(V) Protection of possesions	Phillip 21	2	19	26	33	
33	(V) Protection	Phillip 22	14	19	35		
34	(V) Return to normal	Phillip 23	14	19	37		
35	(V) Responsibility to others	Phillip 24	14	19	26	28	37
36	(V) Survival	Phillip 25	14	19	26	28	33
37	(V) Peace of mind	Phillip 26	14	19	26	33	
		Phillip 27	7	21	37		
		Phillip 28	7	31			
1	(A) Previous experience	Phillip 29	7	11	8	21	37
2	(A) Hazard knowledge	Phillip 30	7	11	37		
3	(A) Early warning	Phillip 31	7	11	26	28	37
4	(A) Shared experiences	Phillip 32	7	11	26	28	33
5	(A) Ease of preparing	Phillip 33	7	11	26	33	
6	(A) Belief in preparing	Phillip 34	13	21	37		
7	(A) Relevance	Phillip 35	4	21	37		
8	(A) Salience						
9	(A) Receptive to ideas						
10	(A) Individual responsibility	Ruth 1	7	31			
11	(A) Sources of information	Ruth 2	7	25			
12	(A) Fatalism	Ruth 3	7	21	31		
13	(A) Inconvenience	Ruth 4	7	21	35		
14	(A) Influence of others	Ruth 5	11	8	25		
15	(A) Reticence	Ruth 6	11	8	21	31	
16	(A) Awareness of preparing	Ruth 7	11	8	21	35	
17	(A) Active preparing	Ruth 8	11	8	19	37	
18	(C) Thinking about issues	Ruth 9	11	8	2	25	
19	(C) Discussing issues	Ruth 10	11	8	16	32	
20	(C) Confident	Ruth 11	11	19	37		
21	(C) Community Involvement	Ruth 12	11	2	25		
22	(C) Uncertainty	Ruth 13	11	16	32		
23	(C) Lack of motivation	Ruth 14	4	19	37		
24	(C) Reticence in talking	Ruth 15	4	37			
25	(C) Unprepared	Ruth 16	4	33			
26	(C) Physical protection	Ruth 17	4	32			
27	(C) Self sustaining	Ruth 18	4	14	37		
28	(C) Shelter	Ruth 19	4	14	2	25	
29	(C) Transferring responsibility	Ruth 20	4	14	16	32	
30	(C) Distrust	Ruth 21	22	25			
31	(C) Trust	Ruth 22	22	30			
32	(V) Protection of possesions	Ruth 23	13	21	31		
33	(V) Protection	Ruth 24	13	21	35		
34	(V) Return to normal						
35	(V) Responsibility to others						

36	(V) Survival	trudy 1	2	26	33		
37	(V) Peace of mind	trudy 2	2	16	28	33	
		trudy 3	11	16	28	33	
		trudy 4	11	8	16	28	33
1	(A) Previous experience	trudy 5	11	8	19	37	
2	(A) Hazard knowledge	trudy 6	11	8	25		
3	(A) Early warning	trudy 7	1	16	28	33	
4	(A) Shared experiences	trudy 8	14	16	28	33	
5	(A) Ease of preparing	trudy 9	14	25			
6	(A) Belief in preparing	trudy 10	13	25			
7	(A) Relevance	trudy 11	13	15			
8	(A) Salience						
9	(A) Receptive to ideas						
10	(A) Individual responsibility	Wayne 1	1	6	17	28	
11	(A) Sources of information	Wayne 2	1	6	17	32	
12	(A) Fatalism	Wayne 3	1	6	17	34	
13	(A) Inconvenience	Wayne 4	1	17	28		
14	(A) Influence of others	Wayne 5	1	17	32		
15	(A) Reticence	Wayne 6	1	17	34		
16	(A) Awareness of preparing	Wayne 7	1	3	17	28	
17	(A) Active preparing	Wayne 8	1	3	17	32	
18	(C) Thinking about issues	Wayne 9	1	3	17	34	
19	(C) Discussing issues	Wayne 10	1	3	30	19	37
20	(C) Confident	Wayne 11	1	3	30	19	35
21	(C) Community Involvement	Wayne 12	19	30			
22	(C) Uncertainty	Wayne 13	7	11			
23	(C) Lack of motivation	Wayne 14	7	30	19	37	
24	(C) Reticence in talking	Wayne 15	7	30	19	35	
25	(C) Unprepared	Wayne 16	7	21			
26	(C) Physical protection	Wayne 17	15	21			
27	(C) Self sustaining	Wayne 18	15	25			
28	(C) Shelter	Wayne 19	13	21			
29	(C) Transferring responsibility	Wayne 20	8	17	28		
30	(C) Distrust	Wayne 21	8	17	32		
31	(C) Trust	Wayne 22	8	17	34		
32	(V) Protection of possesions	Wayne 23	8	25			
33	(V) Protection	Wayne 24	26	25			
34	(V) Return to normal	Wayne 25	23	25			
35	(V) Responsibility to others	Wayne 26	5	25			
36	(V) Survival	Wayne 27	5	35			
37	(V) Peace of mind						

Appendix E continued

Implication matrix for Napier interviews

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	Total
1	(A) Previous experience		1				2.01		1.01			3	1.01					3.03	3.03	0.03	1.02	0.03	1.02	0.01	0.02	1.02	1.04	0.03		1.01	0.01	0.02	0.01	0.04	1.01	1.04	0.03	0.03	21.51
2	(A) Hazard knowledge	1			1.01	0.01	4.01		4.01			2	2	1			1.01	9.05	4.03	1.05	0.02	0.03	0.01	0.02	0.02	1.04	4.05	1.04	3.02	0.01	0.01	0.02	1.02	1.08	0.02	1.04	0.05	0.03	42.71
3	(A) Early warning																	1															0.01				0.01	0.01	1.03
4	(A) Shared experiences											1					0.01		1							0.01								0.01					2.03
5	(A) Ease of preparing						1																			1	1.01			0.01		0.01							3.03
6	(A) Belief in preparing																	4	1	1.02	1	0.02					1.01	1.02	0.01	0.01		0.01	0.01	0.03		1.02	1.02	0.02	11.2
7	(A) Relevance								0.02			9			0.01		0.01	1.05	2.03	0.02		1.02	1.01	0.01	1.01	0.01	1.02	0.01	0.01	0.01	3.02	5.03	0.02	0.04		0.02	0.02	0.04	24.44
8	(A) Salience						1					2.01	1		0.01		3	2.03	3.02	5.01	0.01	3.01	0.01	5.01	3.02	2.02	0.03	0.03			1	1		0.04	0.02	0.03	0.04	0.02	32.37
9	(A) Receptive to ideas																																						0
10	(A) Individual responsibility															1		1			0.01	3.02		0.01				0.01						0.01		0.02			5.08
11	(A) Sources of information				1				4						1		1	7.02	3.02	2.03	0.01	0.03	0.01	0.01	0.01	0.01	1.02	0.02	0.01	0.01	1.01	0.02	0.02	0.05		0.03	0.02	0.05	21.41
12	(A) Fatalism																		1				1			2.01									1.01		0.01		5.03
13	(A) Inconvenience					1																				2.02													3.02
14	(A) Influence of others					0.01		1	1			1.01		1			0.01	1.02	1	1				0.01		0.02	0.01							0.01	0.01		0.01	1	8.12
15	(A) Reticence																					1		1															2
16	(A) Awareness of preparing																	2						1		1	1.01	1						1.01	0.01		0.02		7.05
17	(A) Active preparing																			3	0.01	2.01					3	4.01	1				2	3.04	1.01	0.03	1.03	1.03	21.17
18	(C) Thinking about issues																			1		1.01	1		0.01	1		1			0.01	1		0.02		0.02			6.07
19	(C) Discussing issues																	1	1			1				1								2		0.01		1	7.01
20	(C) Confident																					1			1											0.01	1		3.01
21	(C) Community Involvement																		1		1							1						2		6	0.01	1	12.01
22	(C) Uncertainty																								0.01	2					1				1				4.01
23	(C) Lack of motivation																									1													1
24	(C) Reticence in talking																																						0
25	(C) Unprepared																			1																	1	0.01	2.01
26	(C) Physical protection																											1.01	1	0.01		1		1.01		0.01	0.01		4.05
27	(C) Self sustaining																																				3		3
28	(C) Shelter																											1					1	2		1		1	6
29	(C) Transferring responsibility																																						0
30	(C) Distrust																								1														1
31	(C) Trust																													1									1
32	(V) Protection of possesions																																				1	2.01	3.01
33	(V) Protection																																					1	1
34	(V) Return to normal																																						0
35	(V) Responsibility to others																																				1		1
36	(V) Survival																																		1			1	2
37	(V) Peace of mind																																	1					1
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
	Totals	1	1	0	2.01	1.02	8.02	1	10.04	0	0	18	4.01	2	1.02	1	5.04	32.2	21.13	15.16	3.08	13.18	4.06	7.08	6.1	15.2	13.2	11.18	5.05	2.07	6.06	8.11	4.09	13.39	5.09	10.28	9.28	9.25	

Implication matrix for Benalla interviews

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	Totals
1	(A) Previous experience		4	6	2	0.01	4.02	3.02	5.03		0.01	0.06	5.01			0.02	0.02	8.08	9.04	4.06	1.01	3.06	5.02	0.03	1.05	1.01	6.03		0.02	2.02	1.06	1.06	1.03			0.08		0.06	72.92
2	(A) Hazard knowledge			2		1		4	6.01		0.01	2.03	1.01			0.01	2.02	2.02	3.05	2.05	0.01	1.04	3.03	0.05	0.04	2.02	4.02		1.01	1.01	0.05	1.04	0.02	0.01		0.04	0.01	0.03	38.64
3	(A) Early warning						0.01		1			0.01				0.01		8.02	0.01	0.01	1	1.01	1		0.01		0.02		0.02		4	0.01	0.04			0.01		0.01	16.2
4	(A) Shared experiences															1				2.01		3			3											0.03		0.03	9.07
5	(A) Ease of preparing										1											1.01		0.01		2										0.02			4.04
6	(A) Belief in preparing								1							0.01		3.01	1	1.01		0.01	0.01				0.01		0.02				1.03			1		1.02	9.13
7	(A) Relevance			1								6				1		1.02	1	2.02		3.01	4.01	0.01	2	0.01				1	7.02	7.02	0.01			0.03		0.01	36.17
8	(A) Salience			1		0.01		1			1	3.02	1			1.01	2	2.02	5.01	7.01	1	5.03	2.01	3.03	4.01	2.03	0.02		0.01		1.03	1.02	0.02			0.05		0.04	43.38
9	(A) Receptive to ideas																			1		1									4	2							8
10	(A) Individual responsibility					1						1.01						1.02				5		1												1.02			10.05
11	(A) Sources of information																	3.01		1		1.01				1			0.01		0.01	0.02			0.01			6.07
12	(A) Fatalism																							1						1									2
13	(A) Inconvenience												1					1								1													3
14	(A) Influence of others			1				2	1			0.02						0.02	0.02	1.01		2.01	0.01		1.01	0.01					0.01	0.02				0.02		0.01	8.17
15	(A) Reticence												1							1		1	3	1	1														8
16	(A) Awareness of preparing											1										2														0.01			3.01
17	(A) Active preparing						1					0.01				0.01					1	1			0.01		1		1.01				5.01					0.01	10.06
18	(C) Thinking about issues																			3						1	1				1		1.01						7.01
19	(C) Discussing issues											0.01						1.01	1			3										1.01	3.02			5.02		4.02	18.09
20	(C) Confident															1									1														2
21	(C) Community Involvement											1						1		1						1					1	1	1			6		1.01	14.01
22	(C) Uncertainty											0.01						0.01				1		1		1.01					1	1							5.03
23	(C) Lack of motivation																									1					1								2
24	(C) Reticence in talking																													1									1
25	(C) Unprepared																																						0
26	(C) Physical protection															0.01					1				0.01				1									0.01	2.03
27	(C) Self sustaining																																						0
28	(C) Shelter																																1	1				2	4
29	(C) Transferring responsibility																																						0
30	(C) Distrust																																						0
31	(C) Trust																																						0
32	(V) Protection of possesions																																						0
33	(V) Protection																																						0
34	(V) Return to normal																																						0
35	(V) Responsibility to others																																					1	1
36	(V) Survival																																						0
37	(V) Peace of mind																																						0
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
	Totals	0	4	11	2	2.02	5.03	10.02	14.04	0	2.02	14.18	9.02	0	0	4.08	4.04	31.24	20.13	26.18	5.02	34.19	18.09	7.13	13.14	12.09	13.1	0	3.1	6.03	21.17	15.19	13.21	1.01	0	13.34	0.01	9.26	

Implication matrix for Invermay interviews

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	Totals
1	(A) Previous experience		1	1	0.01		1	2	2	1						0.02	1.01	2.01	1	1.03		0.01	0.01			0.04	1.01	1	0.02	0.01	0.03	0.03	0.01	0.01	0.01	0.02	0.01	0.02	15.32
2	(A) Hazard knowledge				0.01			5	6.01			1.01	2.01	0.01		0.07	2.02	2	7.03	4.05		0.04	0.04	0.03	0.03	4.07	4.02	0.01	0.02		0.05	0.06	0.02	0.04		0.04	1.01	0.03	38.73
3	(A) Early warning																	2		0.01								0.01	0.02		1		0.02	0.01	0.01	0.02		0.03	3.13
4	(A) Shared experiences		0.01												1	3	0.01		0.01	3		4			1	2.01					1	1.01	1		1		1.01	19.06
5	(A) Ease of preparing											2														2										1			5
6	(A) Belief in preparing																	2										0.01	0.02				0.02	0.01	0.01	0.01		0.01	2.09
7	(A) Relevance								0.02			6		0.01		5.01	0.01		0.01	2.01		5.03		0.01	0.01	3.02	0.01		0.01	0.01	8	10.03		0.01		0.04		1.03	40.28
8	(A) Salience		1		1							1	2	1		5.01	4	1	2.01	8		3.01	5	2.02	3	9.03			0.02	0.01	2	3.02	0.02	0.01	0.01	0.02		0.05	53.24
9	(A) Receptive to ideas															2						1				1.02				0.01	3	1				1			9.03
10	(A) Individual responsibility																																						0
11	(A) Sources of information		2						6					0.01		0.02	3.05		1.01	1.03		0.04	0.01	0.01	0.01	0.05	1.01		0.02	0.01	0.01	0.04	0.01	0.02		0.02	0.01	1.03	15.42
12	(A) Fatalism																									2													2
13	(A) Inconvenience															1						3				6						0.01				0.01		0.01	10.03
14	(A) Influence of others		4					0.01	3.02			0.01	0.01			0.01	3.02		2.01	3.03		0.02	0.03	0.01		3.04	1.02	0.01	0.02		0.01	0.01	0.02	0.03		0.03	0.01	1.02	20.4
15	(A) Reticence																					1		2		1													4
16	(A) Awareness of preparing																											1	1				2.01	0.02				0.01	4.04
17	(A) Active preparing						1																				1	2	2				2	1.01	1	0.01		1	11.02
18	(C) Thinking about issues																			2		1.01	1									1	1	1		0.02		0.01	7.04
19	(C) Discussing issues		1					1	0.01							0.01	0.01		1.01			2	0.01	0.01		0.01	1		0.01		1.02	0.01		0.01		4.01		7.01	18.14
20	(C) Confident																																						0
21	(C) Community Involvement																															1				2		2	5
22	(C) Uncertainty																		1							3					1								5
23	(C) Lack of motivation															1										1													2
24	(C) Reticence in talking																																						0
25	(C) Unprepared																																						0
26	(C) Physical protection																									1			1					2.01			1	0.01	5.02
27	(C) Self sustaining																																1	1		1		1	4
28	(C) Shelter																																	1.01				1	2.01
29	(C) Transferring responsibility																																						0
30	(C) Distrust																			1						1										0.01		0.01	2.02
31	(C) Trust																									1.01				1									2.01
32	(V) Protection of possesions																																						0
33	(V) Protection																																						0
34	(V) Return to normal																																						0
35	(V) Responsibility to others																																						0
36	(V) Survival																																						0
37	(V) Peace of mind																																						0
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
	Totals	0	9.01	1	1.02	0	2	8.01	17.06	1	0	10.02	4.02	1.03	1	17.2	13.13	9.01	15.1	25.16	0	20.16	6.1	4.09	4.05	40.3	9.07	4.04	4.16	1.05	16.12	17.21	7.14	7.2	1.04	10.26	2.04	16.29	